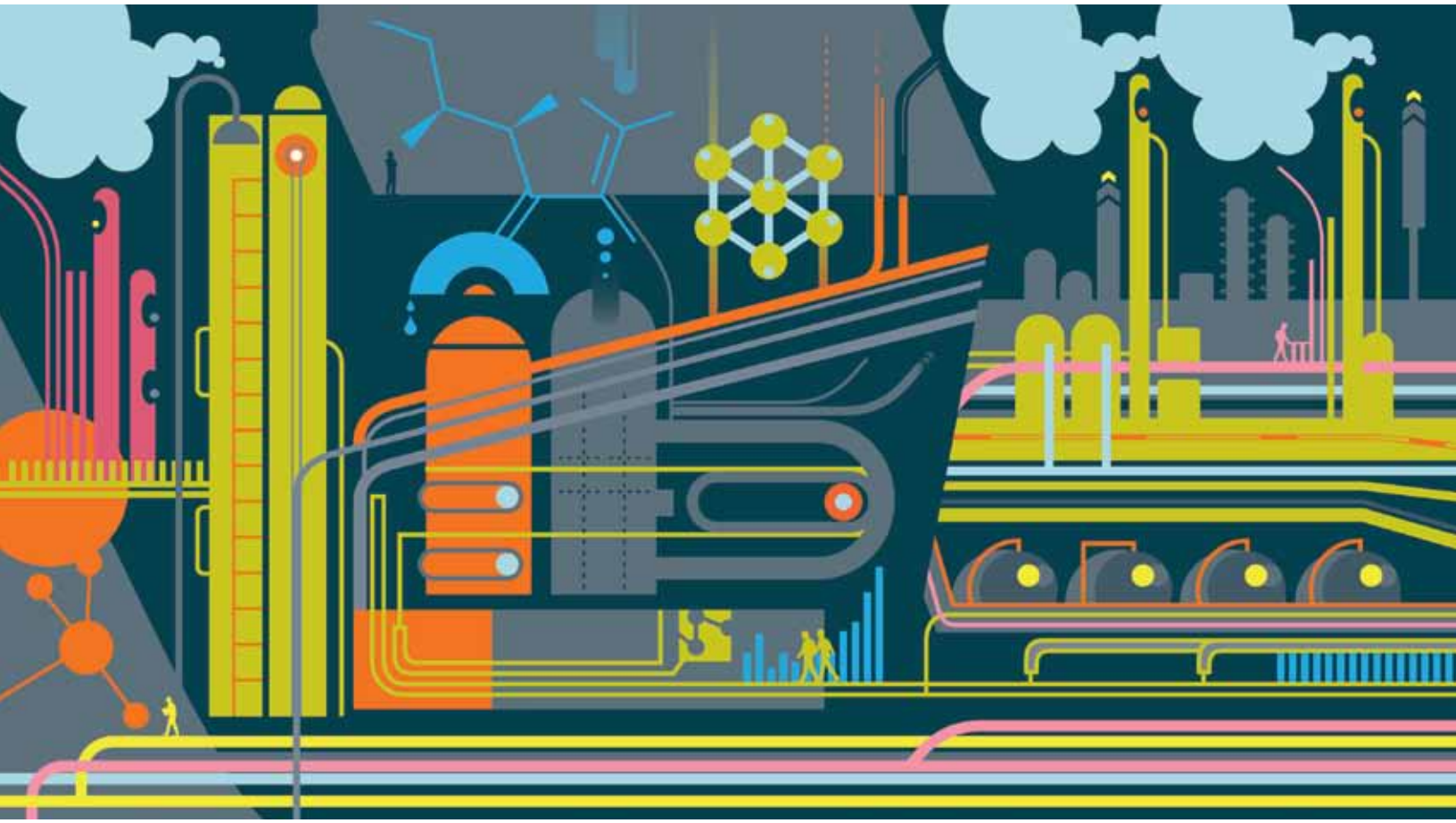
McKinsey on Chemicals

Number 4,
Spring 2012



McKinsey on Chemicals is written by consultants in McKinsey's global chemicals practice together with other McKinsey colleagues.

This publication offers readers insights into value-creating strategies and how to translate these strategies into company performance.

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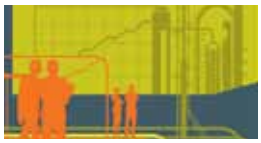

Introduction

**Florian Budde,
Tomas Koch,
and John Warner**

Welcome to the fourth issue of *McKinsey on Chemicals*

The global chemical industry has done better than most industries in the aftermath of the 2008–09 downturn, enjoying a healthy rebound reflected in overall profitability and stock-market valuations. But with a slowdown in the global economy evident in the latter part of 2011, along with a continued slow recovery in the United States and ongoing problems in Europe, senior chemical-company management teams are again focused on how to deliver sustainable, value-creating growth.

Our first article, which provides a capital-market perspective on the chemical industry, underlines the growth imperative. As "Squaring the circle: The hunt for profitable growth" shows, capital markets continue to look for high return-on-invested-capital (ROIC) performance at chemical companies. But given that the industry—looked at in aggregate—has established a good track record over the past decade in delivering returns that more than cover its cost of capital, markets are now showing a readiness to award valuation premiums to chemical companies that are able to deliver growth as well as high ROIC performance. It is well recognized that achieving such growth is no easy feat; we outline a set of levers that senior managers can deploy to help navigate the path toward this goal.

We then look at two dimensions of the growth puzzle: growth in new products and geographic growth. On the first, new-product innovation is a perennial area of promise, but the long lag time that new-materials commercialization typically requires to realize meaningful revenues is a major source of frustration. "The path to improved returns in materials commercialization" categorizes six classic commercialization pitfalls that have beset innovative companies and describes the capabilities that companies need to avoid such pitfalls and commercialize successfully.

Green chemicals and materials are an important frontier in new products. With that in mind, we recently surveyed executives in major chemical-consuming industries and consumers. "The growing demand for green" presents these survey results and suggests new ways chemical companies might think about tapping the green opportunity.

Turning to geographic growth, most industry players now recognize that capturing expansion

opportunities in emerging markets is an imperative for any global chemical company. India has traditionally appeared a difficult market to embark in, as reflected in the low level of chemicals investment to date by international companies. But as our article "Winning in India: The specialty-chemicals opportunity" shows, India is now in takeoff mode. There is a strong case for international companies that are not yet fully engaged in India to look again, as well as for companies that have a long-standing but superficial presence to reenergize their activities in India.

One of the most successful specialty-chemical companies in India is United Phosphorus, which over the past 20 years has established itself as a leading player in the worldwide crop-protection-chemicals industry. "An Indian specialty-chemicals success story: An interview with United Phosphorus Limited's Jai Shroff" provides insights from the CEO of one Indian company that has cracked the growth code. United Phosphorus has decisively leveraged low-cost Indian production to build up a global business and is by far the biggest Indian specialty-chemicals company to implement this strategy to date.

We mentioned earlier how the challenges of volatility and uncertainty are a main focus for senior chemical-industry management teams. Nowhere is this more pronounced than in petrochemicals, where high and unstable oil prices, combined with structural shifts in global petrochemicals and refining, have made obsolete the traditional approaches used to evaluate future capital investments. "Using microeconomics to guide investments in petrochemicals" presents a new way that companies can build margin-outlook scenarios based on higher-quality insights into price relationships, and thus be able to make the right investment decisions.

Finally, we are introducing a new section to *McKinsey on Chemicals*, "Spotlight," in which we focus on areas of best practice that are generally recognized in the industry but that we believe many companies would benefit from revisiting. In this issue, our Spotlight topic is how to profitably manage small customers.

In this and future issues of *McKinsey on Chemicals*, we will bring you our best thinking in the field. We trust that you will find the publication thought-provoking, and we welcome your feedback and suggestions for topics to cover, in addition to those we are already working on. Please write to us at McKinsey_on_Chemicals@McKinsey.com.

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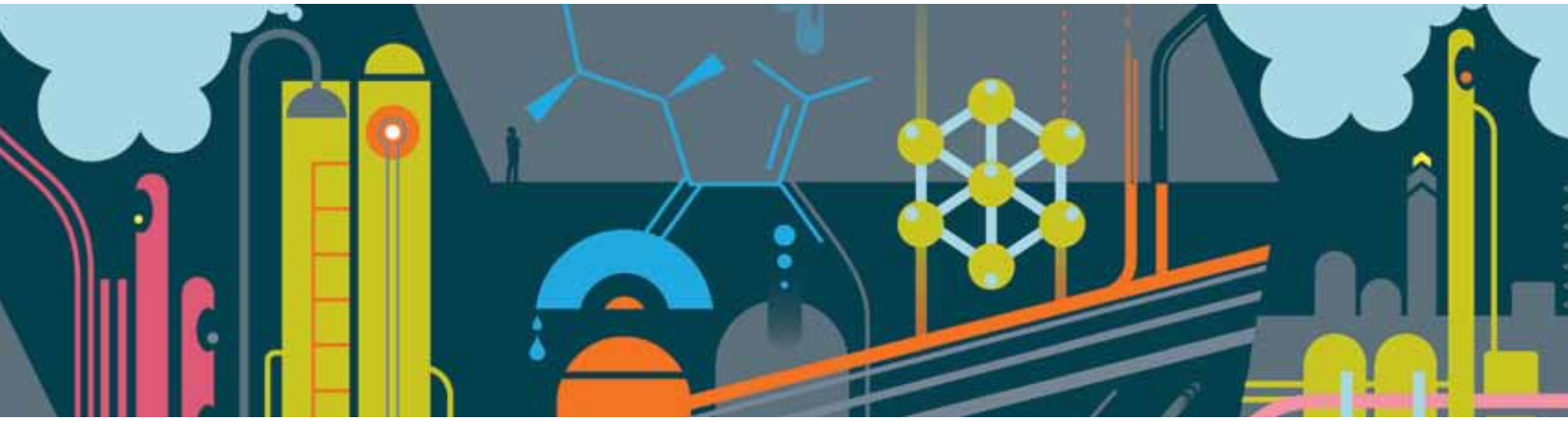


Squaring the circle:
Growth and value creation

Capital markets have been pleased with the chemical industry's high profitability levels. But future value creation will require that companies achieve growth while maintaining this performance.

Florian Budde, Christoph Schiller, and Christoph Schmitz

The chemical industry is riding high in the capital markets, still largely due to excellent performance in return on invested capital (ROIC). At the same time, profitability levels have risen to well above the weighted average cost of capital (WACC), which has made it possible for growth[1] to make something of a comeback as a valuation factor. And growth is likely to come even more into focus as the headroom for ROIC improvements declines. The value-creation challenge will therefore be to "square the circle"—that is, to identify and exploit new capital-investment opportunities to deliver growth, but to do so without sacrificing profitability. We believe companies can use four key ingredients to prepare carefully balanced strategies as they pursue profitable growth in today's chemical industry: they must earn the right to grow through functional excellence, use portfolio momentum effectively, do as the locals do in emerging markets, and focus M&A explicitly on value creation.

The capital-market perspective updated

The good news is that we are seeing a continuation of the positive capital-market trends for the chemical industry described in the 2011 issue of *McKinsey on Chemicals*.

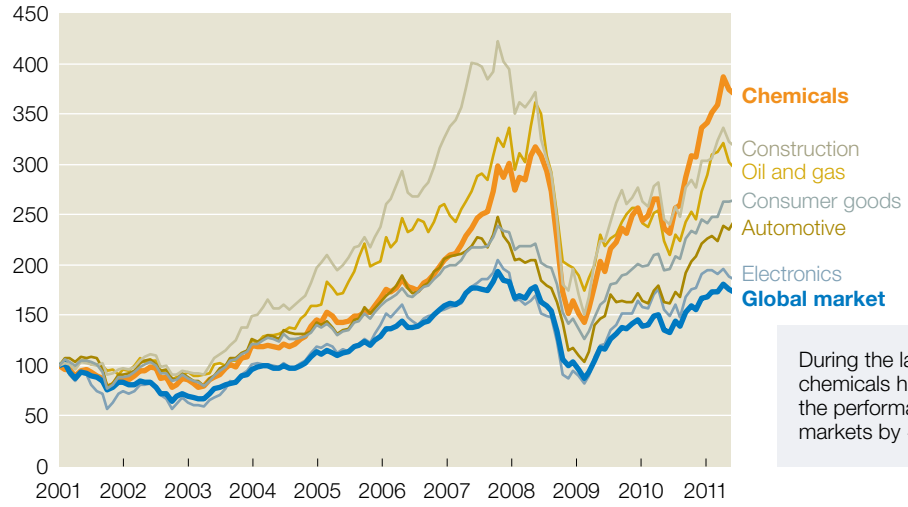
Chemicals show stellar performance, based mainly on profitability gains. On average, chemical companies lead the pack, recently trumping the

[1] Growth, in the context of this article, refers to growth in invested capital.

Exhibit 1

Chemicals are leading the market.

Total return to shareholders (TRS),
indexed; 100 = December 31, 2000, $



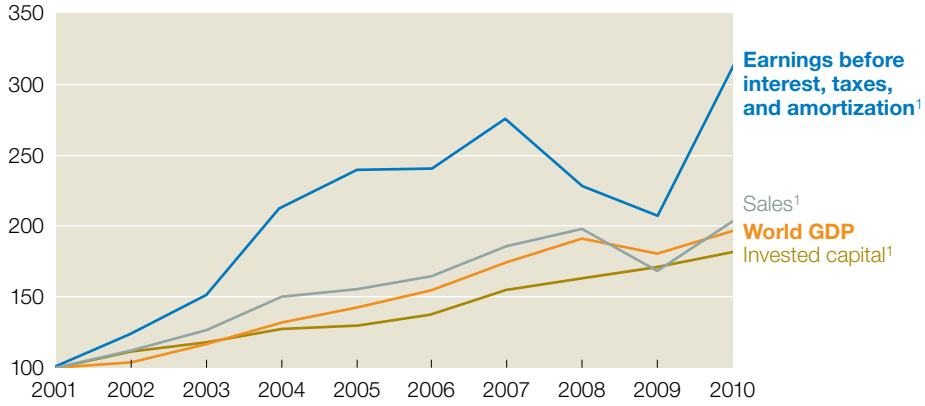
During the last 18 months, chemicals has widened the performance gap to global markets by ~90 TRS points

Source: Datastream; McKinsey chemicals capital-markets perspective, 2011 update

Exhibit 2

Chemicals outperformed the market based on profitability gains.

Increase,
nominal, indexed; 100 = December 31, 2000,
percentage points



[1]Data of 100 selected companies of the chemical industry, excluding fertilizers.

Source: Datastream; McKinsey chemicals capital-markets perspective, 2011 update

This year's analysis is based on data from 2001 to 2010, drawn from a proprietary McKinsey database. It includes 100 chemical companies with sales in excess of $1 billion, covering approximately 67 percent of chemical-industry market capitalization and spanning all chemicals subsectors. Income-statement and balance-sheet data have been adjusted to make figures comparable and consistent. Annualized performance metrics used include total return to shareholders, trading multiples, return on capital, cost of capital, and capital efficiency.

global share-price performance of stock-listed oil and gas companies, as well as that of most of chemicals' customer industries, such as the automotive, construction, and consumer-goods sectors. This lead has lengthened significantly over the past 18 months (Exhibit 1). Profitability gains, not growth, are the most important factor here. Increases in earnings before interest, taxes, depreciation, and amortization (EBITDA) have far exceeded nominal world GDP growth; the compound annual growth rate (CAGR) for EBITDA was 13.5 percent in the 2001–10 period, compared with a CAGR of 7.6 percent (not adjusted for inflation) for nominal world GDP growth. Sales and invested capital—key indicators of chemical-industry growth—more or less tracked GDP (Exhibit 2).

ROIC remains preeminent. Analyses based on capital markets' valuation methods confirm that the absolute valuation of chemical companies is still predominantly driven by ROIC performance (Exhibit 3). This trend is increasing in strength, with the correlation coefficient of valuation (with regard to its enterprise value to invested capital ratio) and operating profitability (ROIC) showing an overall positive slope over the past 10 years.

[2]The period discussed here is 2001–03, for data-sample consistency. However, our analysis shows the same valuation effects across the 1996–2003 period.

Growth is now valued again. For a time, the stock markets shunned growth as a valuation driver. In the first three years of the period under discussion, 2001–03, growth had little effect on valuation; in the several years prior to that period, the effect was also hardly in evidence.[2] But it has been welcomed back: companies with sales growth above the median for 2003–10 (5.3 percent per annum) enjoyed a significantly higher valuation in 2010 than those with sales growth below the median (Exhibit 4). The main cause of the change is the increase in ROIC levels described earlier: as ROIC rose to about 14 percent in the early 2000s and thereby significantly exceeded WACC, growth began to create value again. By comparison, growth was often an ineffectual or even value-destroying force in 2001–03, when ROIC levels hovered near WACC at about 11 percent.

The next advance in value creation has to come from profitable growth. However, a new challenge awaits. After years of productivity improvements, increasing profitability via productivity will eventually become more and more difficult. To up their game in performance and value creation, chemical companies will need to identify and exploit new capital-investment opportunities to grow their businesses and at the same time maintain their high profitability levels—or even increase them. Put another way, value creation will have to move up and to the right on the matrix that maps profitability and size (Exhibit 5). Squaring the circle, then, is an appropriate metaphor for the feat that will be required of senior chemical-company management teams.

What makes growing profitably so difficult?

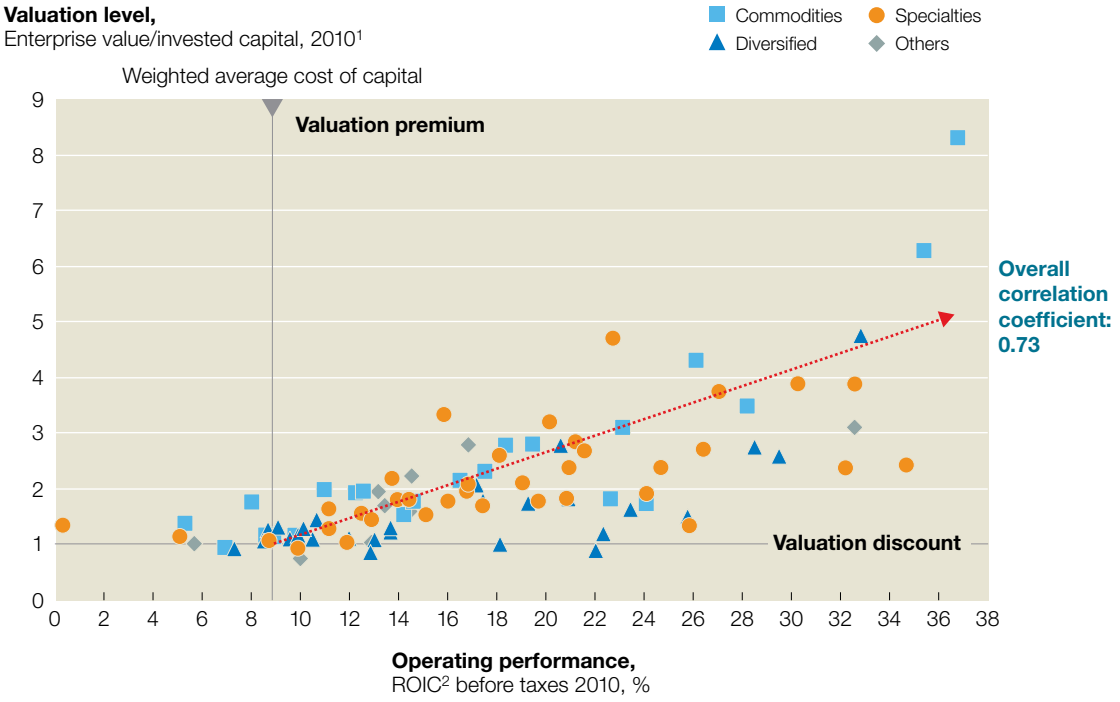
Accomplishing this task is likely to be harder today than at any time in the past. After a long period of stable and predictable boundary

conditions, the chemical industry is navigating highly changeable waters. Companies must learn to face up to crises induced by a highly ambiguous, volatile, and uncertain environment, and they will need to consider changes in their regional market focus and the location of capital assets.

The fast-changing environment makes it difficult to bet on the 'right' trend. Making the right strategic bets is particularly difficult in the current environment. Continuous shifts in technologies and the entrance of new competitors must be considered alongside volatility in financial markets and prices for raw material and energy, and they are compounded by regulatory and resource constraints. The variety of choices and the speed of change are immense, as is the uncertainty of outcomes. Moreover, in an industry where large, very expensive, and immobile assets have a life span of 30 years and more, particular care should be taken when making choices under uncertainty.

Exhibit 3

ROIC performance is the main driver of chemical valuations.



[1]Invested capital (IC) includes goodwill, 2010 market data as of December 31, 2010; IC = 2010 adjusted for latest-quarter (2010) property, plant, and equipment and for goodwill (where actual numbers not available).
[2]Return on invested capital.

Source: Datastream; McKinsey chemicals capital-markets perspective, 2011 update

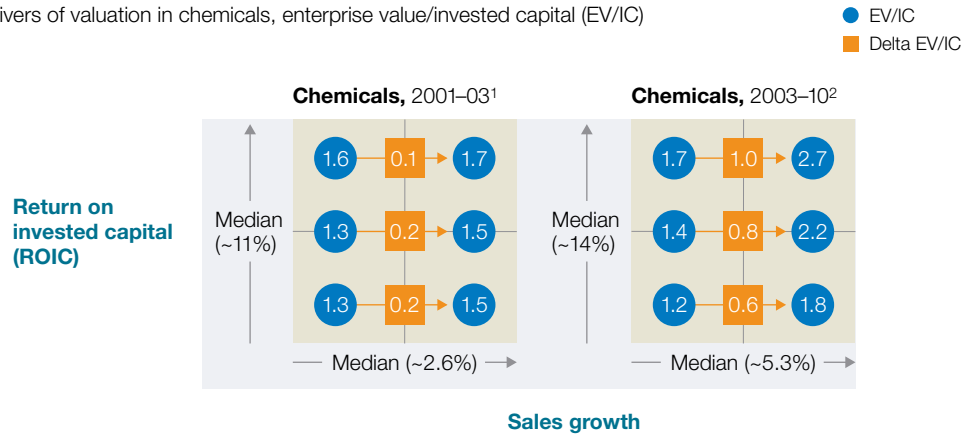
For Western players, a value-creating presence in emerging markets is difficult to establish and maintain. Given the eastward shift in regions of high demand, tapping this growth will require a presence in Asia and particularly in China. However, Western companies face two key problems here. First, although the East initially opened up to them, foreign players are now finding it increasingly difficult to establish a foothold or expand. For example, local companies often enjoy a privileged position in ongoing industry consolidation. Second, many Western companies are still struggling to ensure value creation in Asia. Causes of poor performance include selling products that are not tailored to Asian markets; supplying from faraway assets built and operated to Western standards, which results in lower ROIC; using Western financing and therefore non-competitive WACCs; and relying on centers of authority and management teams that are physically distant. Nevertheless, with China set to account for a significant share of industry growth in the next 10 years, having a presence in these markets is likely to be a condition of success.

Procyclical investment activity and focus on the same M&A targets are making value creation an increasing challenge. Chemical companies, especially commodity players, make life more difficult for themselves by engaging in herd behavior, which also hurts profitability. Many companies follow the same investment pattern: net investment follows the ROIC curve, lagging behind it typically by one to two years, resulting in overcapacity and an industry

Exhibit 4

Growth is valued again.

Drivers of valuation in chemicals, enterprise value/invested capital (EV/IC)



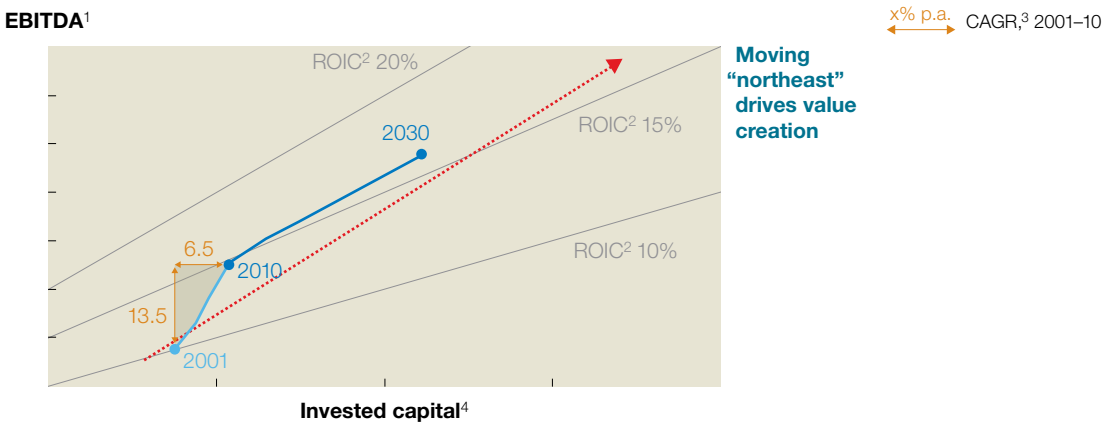
[1]EV/IC as of 2003; pretax ROIC (including goodwill), average ROIC (2001–03); sales growth (compound annual growth rate, or CAGR), 2000–03; acquisitions and divestitures included in growth figures. The period shown is 2001–03, for data-sample consistency. However, our analysis shows the same valuation effects across the 1996–2003 period.
[2]EV/IC as of 2010; pretax ROIC (including goodwill), average ROIC (2003–10); sales growth (CAGR), 2002–10; acquisitions and divestitures included in growth figures.

Source: McKinsey chemicals capital-markets perspective, 2011 update

Exhibit 5

The next wave of value creation needs to come from profitable growth.

CONCEPTUAL



[1]Earnings before interest, taxes, depreciation, and amortization.
[2]Return on invested capital.
[3]Compound annual growth rate.
[4]Including goodwill.

Source: McKinsey chemicals capital-markets perspective, 2011 update

margin squeeze. Too few companies attempt to break out of this well-recognized cycle.

M&A is plagued by the same ailment: most companies look to the same attractive but expensive targets in the same highly profitable and fast-growing sectors. As a result, deals carry increasingly high premiums, making them difficult to justify. In addition, there is a trend toward M&A transactions aimed at diversification (Exhibit 6); in many cases, such transactions offer little in the way of synergies and guide management into new territory. This makes them risky.

Profitable growth: Combining the right ingredients the right way

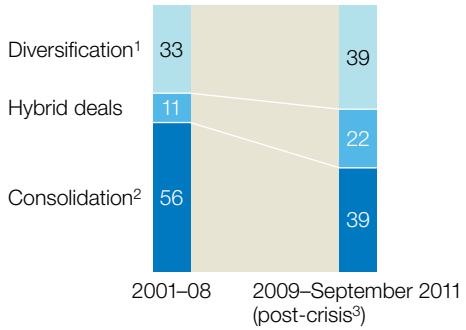
In our opinion, companies are most likely to find their way successfully in the present climate by basing their strategies on four key ingredients. Companies must first earn the right to grow through functional excellence. Second, they must use portfolio momentum effectively, and combine it with positions of power. Third, they should do as the locals do in emerging markets, and fourth, they should focus M&A explicitly on value creation.

These ingredients may appear basic, but to yield successful results, they must be rigorously and uncompromisingly executed. Identifying the right combination and putting it in place to create profitable growth is a game of inches. Given the complex challenges facing the industry, finding a silver bullet that will fix a company's fortunes will prove quite difficult, if not impossible. Instead, all levers must be applied in parallel and in balance.

Earning the right to grow through functional excellence. Functional excellence in innovation,

Exhibit 6

The trend in M&A is toward more diversification deals.



[1]Diversification: deals where the acquirer has entered a new market segment, significantly diversified its product portfolio, or entered a new step in the value chain.
[2]Consolidation: deals with significant overlap in market segments and products, technologies, or geographies.
[3]Includes 3 deals that are in the process of closing.

Source: Dealogic; press search; company Web sites; McKinsey analysis

commercial practice, and operations needs to be addressed continuously, and its importance cannot be overstated. It is the fundamental prerequisite for profitability, mitigating and ideally more than offsetting price pressure, increases in labor cost, and other inflation factors. Supported by comprehensive and rigorous implementation, functional excellence is the key to maintaining ROIC levels that are sufficiently higher than WACC, thus enabling growth to create value. In addition, functional excellence is essential to value creation in postacquisition and postmerger integration. In evaluating M&A moves, companies often fail to consider how functional improvements in the target's operations could complement and very often be worth more than any synergy effects.

Using portfolio momentum effectively and combining it with positions of power. Leveraging portfolio momentum lays out the strategic pathway. Companies must pay close attention to the megatrends influencing the industry in order to discover and tap value pools. To adapt to changes in the markets and the volatility and uncertainty that accompanies them, companies need to exercise more foresight and insight than ever to be at the right location with the right product or technology at the right time. Moreover, because these sweet spots are constantly moving, chemical companies should be sufficiently agile to track them swiftly.

To identify the right opportunities, players have to examine future potential at a sometimes painfully meticulous level of granularity. For example, although crop-protection sectors have recently been popular, not everything food related is a valuable play. In many cases, business leaders should explore the match between products and micromarkets at, for example, the regional or country level, rather than simply looking at a given sector. To be truly attractive, the value pools should be combined and matched with the company's positions of power: natural or acquired advantages such as

distinctive technology, recognized product brands, superior customer-back innovations or solutions, value-added services, privileged raw-material access, or supply positions.

Doing as the locals do in emerging markets. Profitable growth in the chemical industry of the next decade could depend on a presence in the growth markets of Asia, particularly China. For Western multinationals, the best option may well be to do as the locals do, shifting their structures and operating models culturally and geographically closer to these markets.

For example, business leadership and authority should be transferred to the countries in question. The market environment is becoming increasingly regionalized and localized. Multinationals may have a better chance of becoming established if they form part of the local economy and blend with its culture and mind-set. Some leading players have already started to relocate business-unit headquarters from Western countries to the core markets of Asia. In addition, tailoring specifications and therefore reducing capital expenditure to compete with local companies (without jeopardizing compliance with environmental, health, and safety standards) is also likely to be of critical importance to maintaining ROIC performance. Currently, a Western-standard plant in China is 30 to 40 percent more expensive on average than a comparable plant built there by a local company.

Focusing M&A on value creation. As discussed above, it can be extremely difficult to make M&A deals create value. Often, the growth prospects of strategic targets are already reflected in the purchasing price and premium; their attractiveness to many buyers adds further expense. We strongly believe that value creation should be the predominant objective of M&A activities. This opens three principal pathways. One option is for companies to make acquisitions in the middle field of profitability and growth, where lower prices may offer promising value-generating opportunities in less overtly attractive segments. Second, opting out of the cycle and actively managing for cash availability in troughs could help boost value-creating capital investment and M&A behavior. The third option is to pursue the classic play of capturing synergies, but to complement this with a strong focus on stand-alone improvement potential, applying a type of "better operator" approach.

• • •

Squaring the circle to achieve profitable growth is an intricate game in an ambiguous environment. Finding the right strategic mix of functional excellence, making forward-looking technology and product choices, ensuring positions of power, establishing a presence in growing markets (and playing local), and leveraging M&A as a value-creation lever will be important ingredients.

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The path to improved returns in materials commercialization

Six failure modes bedevil chemical companies when it comes to commercialization of new products and materials. Companies that deploy the right capabilities can dramatically speed up times to launch and to achieving meaningful revenues.

Michael Boren, Vanessa Chan, and Christopher Musso

Chemical and materials companies invest a significant portion of their capital in research and development: typically 2 to 3 percent of sales for commodity players and as much as 10 percent for some specialty companies. However, the long lag time for new materials to realize meaningful revenue is a major source of frustration among executives. In some cases, as many as 20 years can pass between the time a product is launched and the time it yields substantial revenue. Given this history, many investors and executives have lost faith in new chemical or materials product launches as viable near-term producers of revenue; product launches in other industries perform better in comparison (Exhibit 1).

This is one reason companies increasingly place their investments in line extensions or incremental product improvements. Launching new classes of chemicals and materials promises to open up entirely new markets, but investment is unappealing because the process is lengthy and involves much uncertainty.

Yet not all such launches are doomed to a slow ramp-up in revenue. While we have not found many companies that consistently launch new materials quickly and successfully, we have observed a number of successful launches. By comparing the successes and failures, we have identified important failure modes that companies encounter related to both value-

proposition and market-segmentation issues, and the capabilities that companies can deploy to commercialize successfully. Understanding and avoiding these failure modes can reduce time to achieving appreciable revenue by as much as 50 percent.

Value-proposition-related failure modes

The value proposition of most materials is simply a performance or cost improvement over alternatives for a given set of market needs. Too often, market needs and the value proposition of new materials are misaligned, which invariably leads to disappointing market share and long adoption time. This misalignment comes in three flavors.

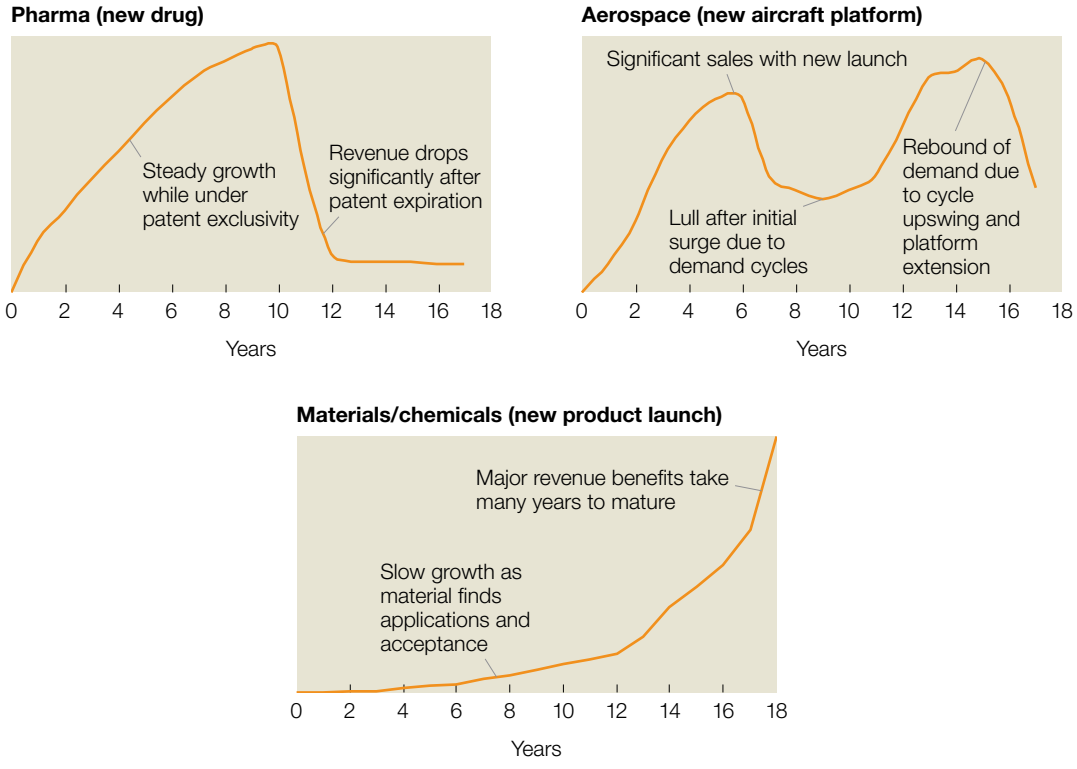
Failure mode 1: The risk disequilibrium

We hear all too often from materials innovators that their customers' testing cycles are irrationally long: "If they could only understand the benefits of our material, they would fast-track it." While it is true that most product manufacturers have waste and downtime in their test cycles, the main

Exhibit 1

Benefits from product launches in chemicals and materials accrue relatively slowly.

Revenue evolution to peak and beyond for various industries



issue is that materials producers tend to fail to understand the risks that their materials create. While the benefits of a new material can be exciting, there is often a great disequilibrium between those benefits and the potential liabilities of failure. Consider, for example, the launch of a new light-weight structural material in the automotive space. The material could offer substantial, quantifiable benefits for critical objectives such as fuel efficiency, but if it failed, it would expose the vehicle manufacturer to tremendous warranty costs or safety issues. As a result, even for this critical need, original equipment manufacturers (OEMs) have instituted comprehensive, arduous—but very rational—testing loops that can last many years, severely damaging the business case for the new material.

There are some application segments that seem to systematically require extended testing because of the risk disequilibrium, but that nonetheless appear irresistible to materials innovators. Entering these spaces typically promises outsize profits and outstanding long-term positions as a specified material in a product, yet often results in broken hearts and canceled materials-development programs. We affectionately call them "impossible" entry segments and find it is rarely advisable to try using them as primary launch spaces. These segments include high-liability arenas such as automotive-safety equipment, in-the-body medical devices, and primary-aerostructure components.

The entry of carbon fiber (CF) into the primary-aerostructure market illustrates the problem. While benefits from the material's light weight and stiffness seem nearly perfectly suited to aircraft construction, there are obviously extreme consequences if primary aerostructures fail. While the core CF material technology was developed in the mid-1960s, it took more than 20 years to find appreciable use in commercial aerostructures and more than 30 years before it became the primary material for the Boeing 787's aerostructure, the first predominantly CF commercial aircraft. Luckily, producers found other uses for the material (including military and sporting-goods applications) while waiting for adoption to spread; otherwise, the world may never have enjoyed the benefits that CF composites bring.

Failure mode 2: Poor segmentation

Companies with exceptional new materials tend to believe that their products appeal to a much broader market than they actually do. This conviction can lead to a dramatic overestimation of market opportunities (often based on the belief that older products will be completely replaced by the new product); companies then overinvest in capacity and broad, fragmented sales and marketing efforts that bear little fruit. This is the result of poor segmentation in the initial strategic marketing. We have seen poor segmentation in many markets, including bioplastics ("We can attack—and win—in all packaging spaces"), construction products ("Our additives will be accepted in every type of concrete, regardless of application"), and electronics ("Why wouldn't every consumer want a more energy-efficient lightbulb enabled by our technology?"). In each of these cases, more detailed market-segmentation analysis revealed that the incumbent offered a superior value proposition for the majority of segments, though the new material surpassed the innovator's expectations in select spaces. Avoiding undersegmentation leads to more effective launch campaigns and better matching of capacity to likely demand, both of which dramatically improve the return on innovation investment.

Benefits that a new material brings to end users do not always equate to benefits to value-chain players

Failure mode 3: The utopian illusion

Most new materials are developed based on a distinctive set of properties that is discovered during early research and development. Unfortunately, companies often become enamored with that set of properties and start to view the material as a utopian panacea, losing sight of how the material actually satisfies customers' needs. They begin to believe that the virtues of the distinctive properties will provide so much value to customers that the material's shortcomings will be overlooked. This is rarely true. More often, the material performs well on one or two requirements, but incumbents may have a stronger value proposition for the complete set of customer requirements. This results in either a lack of adoption or, worse, a flash-in-the-pan launch.

The early launch of high-density polyethylene (HDPE) in the United States is a prime example of companies falling prey to this utopian illusion. HDPE was originally promoted as a superior replacement to low-density polyethylene (LDPE)—capable of doing everything LDPE could do while providing higher heat resistance and greater stiffness, which could open up new applications—and major new plant investments were made. HDPE producers aimed their product at the bottle market and targeted dish-detergent containers for their first conquest. To displace metal containers that held the market, producers highlighted HDPE's elimination of rust, dents, and leaks, as well as its moldability into attractively-shaped containers—and successfully presold their plant output on these claims. Early adopters found, however, that not only was HDPE hard to mold (a drawback known from early tests but overlooked in the rush to market) but also that the new bottles suffered stress fractures. The result: a mass customer exodus and warehouses full of unsold resin. Two years of further development finally enabled HDPE to penetrate the detergent bottle market—one that it has dominated ever since. While the HDPE example dates from 50 years ago and ultimately has a happy ending, launch flops in the intervening years show that the utopian illusion has continued to cast a powerful spell over companies, with a roll call of examples in biopolymers, engineering plastics, elastomers, and electronic materials.

Value-chain-related failure modes

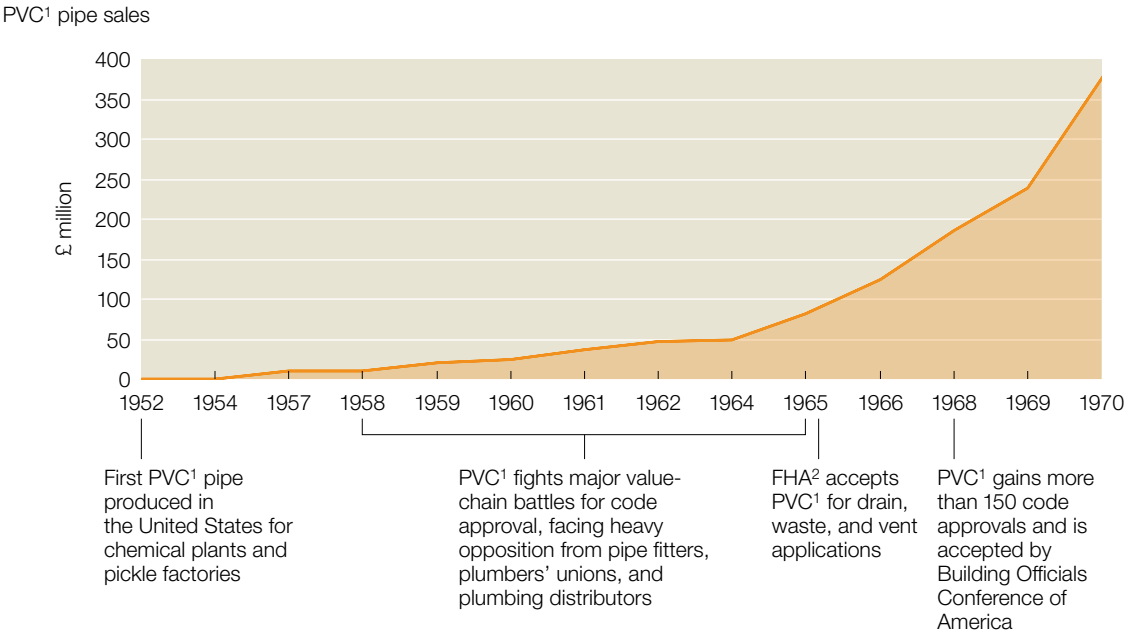
Our research shows that value-chain obstacles can have a tremendous effect on the adoption time for new materials. We have identified three value-chain-related failure modes.

Failure mode 4: Stifled by the loser

New materials are typically matched to markets because of an outstanding performance characteristic that will benefit the end user. However, benefits to the end user do not always equate to benefits to value-chain players. Value chains are often built up—intentionally or inadvertently—to maintain the status quo, generally in the name of quality and on-time delivery. When a new material threatens to negatively affect the status quo, there will naturally be resistance to its adoption.

Exhibit 2

PVC pipe sales took nearly 15 years to reach reasonable volume.



[1]Polyvinyl chloride.
[2]Federal Housing Administration.

Source: Modern Plastics; McKinsey analysis

Perhaps the best historical example of this is the adoption of polyvinyl chloride (PVC) pipe in the United States. Although PVC pipe has grown to be one of the biggest plastics applications, it did not reach reasonable volume until nearly 15 years after its launch. PVC pipe was introduced in North America (as corrosion-resistant pipe for pickle factories) in about 1952, yet widespread use in the all-important housing market did not occur until at least 1965.

Although PVC was less expensive than other options and adequately durable, penetration was slow because it created two losers in the plumbing value chain: plumbers and pipe distributors. PVC threatened plumbers because it simplified a major portion of their hourly work and distributors because it was much less profitable than incumbent metal options. These groups fought hard to keep it out, resulting in approvals delays, which were not fully resolved until 1968—several years after PVC was ready for market (Exhibit 2).

Failure mode 5: 'Drop-in' solution

As seductive as the concept is, and as often as the promise is made, we are skeptical that the elusive "drop-in replacement" material actually exists, and we have found its pursuit considerably extends time to market. Although there are materials that require limited changes at individual steps of the value chain, commercializers must consider the whole chain when launching new products in order to avoid barriers.

There have been numerous initiatives, for example, to use plastics as drop-in replacements for metals and other polymer-based materials in markets such as automobile body parts. Unfortunately, in a significant number of cases the new materials have run into thermal- and chemical-stability issues, developing stress cracks and being unable to perform across the required range of environmental conditions. In the case of automobile assembly, there have also been compatibility issues in key steps such as coatings. Materials producers therefore need to carefully assess their product's performance along the complete value chain, or risk unexpected delays in uptake.

Failure mode 6: Complex value chain

Our research and experience have shown that value-chain complexity has a significant influence on adoption time. Value-chain complexity comes from many sources, including the number of steps in the chain, geographical spread, and contract structures. Complex value chains can inhibit adoption simply because they require such substantial realignment to accommodate new materials. From our perspective, the evergreen promise of polycarbonate (PC) automotive glazing has so far succumbed to value-chain complexity. Although PC glazing can offer dramatic weight-reduction benefits, it has taken far longer than expected to gain scale. Adoption of PC glazing requires multiple supplier tiers to change their production processes, which they are unwilling to do unless they have a clear promise that OEMs will buy the new material. OEMs, however, are unwilling to buy the new material until they see a stable supply chain. As such, materials often face a catch-22, where each player in the value stream is waiting for the others to make the first move. Furthermore, the risk of failure associated with adoption—which causes players in the value chain to raise their prices—increases as the chain becomes more complex, often erasing the original value proposition of a new material.

Improving commercialization through strategic segmentation and market selection

Leaders of the most successful commercialization projects approach the challenge differently than others do. They dig much deeper—and at a much earlier stage—into the value proposition of their products (an activity we call "strategic segmentation"), and they are very selective in choosing entry markets.

Strategic segmentation is a structured process in which technical experts and strategic marketers cooperate to identify the most likely markets—and then market segments—for a new material. While most companies believe they do this, most fail to do so with the necessary rigor. Our experience is that a successful strategic segmentation requires effort and rigor similar to that expended by a mergers-and-acquisitions team doing due diligence on a target.

The process begins with a broad scan of potential applications, based not only on the obviously attractive material properties but also on unique property combinations and more obscure traits. The company then tests the fundamentals of each target market (size, profitability, growth, and critical tailwinds that will help or hurt the need for new materials) and identifies the most exciting segments. The segmentation team tests the basic hypotheses of the value proposition in the most attractive segments, with the dual goals (by segment) of quantifying the value in use versus incumbents and identifying the drawbacks of the new material. This is

typically done over the course of one to two months and involves critical analysis of materials properties, dozens of interviews with end users and converters, and often some prototyping to demonstrate the value proposition.

The result of strategic segmentation is a set of target segments in which the material can potentially play, as well as a much different—stronger or weaker—corporate conviction about the true market potential for the material. This conviction leads to appropriate scaling of both ambition and resource investments.

Strategic segmentation is also critical to dealing with value-chain failure modes, because it informs the most important decision related to commercialization timing: the selection of entry applications. Materials are unique in that they can often be used in many different applications but have one property that can dramatically improve their commercialization potential. The best commercializers take advantage of this property by seeking applications with the best balance of a strong value proposition and low value-chain barriers, recognizing that the two are quite different: that is, the application with the strongest value proposition may not be the best overall creator of value if it will take a long time for adoption to spread. The shortest possible value chain in which players have similar incentives for adoption will be the quickest.

Additionally, the best commercializers are willing to create novel business models to sidestep or

Exhibit 3

Commercialization diligence can dramatically improve the value potential of a new material.

Phases of commercialization diligence

Understand true value proposition of material by segment	Map value chain and key influencers	Develop launch strategy and growth curve
• What are the unique material properties?	• What are the key value chains?	• How is the material likely to grow?
• What are the material drawbacks?	• What has to change for the material to work?	• How should attacks on markets and geographies be sequenced?
• How is the material different from others?	• Who loses if the new material wins, and how will they react?	• What is the business model that maximizes value and minimizes delay?
• Which customers care about material properties?	• Who are value-chain gatekeepers?	• What major risks does the material face?
• How much value will the material create in key segments?	• Who influences gatekeepers?	
• How much will customers pay?		
• How big are potential markets?		

Key outputs
- Understanding of the value proposition in key segments, which may differ from the initial hypothesis
- Clear picture of the value chain, barriers, and influencers
- Initial commercialization strategy/direction
- Growth curve for new material

Typical impact: acceleration of volume by 12 or more months

eliminate value-chain barriers. There are many ways to do this: value-chain partnerships can be forged to create impetus for value-chain players to adopt materials; switching-cost subsidies can be offered to offset required investments in process, technology, or logistics for value-chain players; the commercializer can mimic incumbents by modifying properties to closely match existing products in order to simplify adoption; or the commercializer can pursue forward integration, owning (by acquiring or building) all of the value-chain steps that could limit adoption. The last approach was used to drive the adoption of PET[1] bottles, and it is being widely employed today in the development of CF composites for automobiles by companies such as SGL.

Building institutional commercialization muscle

Building commercialization muscle is not easy, but it can be done. A sequential commercialization-diligence process can be effective to begin institutionalizing this capability (Exhibit 3). However, experience has shown that a process alone is insufficient in the chemical and materials industries. Because most marketers and researchers in those industries have spent their careers chasing volume with (at best) incremental changes to existing projects, they lack the mind-set and skills needed for groundbreaking commercialization.

An institutional commercialization capability requires a cadre of trained and experienced commercialization experts who are both capable of the deep analytics needed for strategic segmentation and creative enough to generate novel business models. There are few non-executive roles in most companies where these skills coexist, so it is necessary to carefully screen for the role and to provide heavy training (usually in apprenticeship on commercialization projects). Furthermore, depending on the frequency of product launches at a company, 12 to 18 months of apprenticeship may be required. While this training may appear daunting, the silver lining is that the skills for successful commercialization are often helpful in senior-management positions.

The mind-set and expectations of senior management are also critical to successful commercialization. When making innovation investments in chemicals and materials, executives must recognize that commercialization is a long process, taking as little as one to two years to attain appreciable volume for simple line

[1] Polyethylene terephthalate.

extensions in existing markets and lasting seven or more years for breakthrough projects in unfamiliar markets. While it takes less time when the right skills and activities are in place, this is not an activity that starts in one quarter and pays off in the next. From the outset of a development project, the senior team must have the resolve to execute it.

This is not to say that a project should be left to its own devices—quite the contrary. The best projects have clear but reasonable milestones that point toward commercial success. These milestones typically include the achievement of technical goals, the establishment of the product's value proposition in core markets, and success in early applications as a path to long-term viability in core markets. Commercialization teams must be managed according to these milestones, and projects that fail to reach them must be canceled.

• • •

The commercialization of novel materials is an inherently long process that is fraught with challenges. How these challenges are handled makes the difference between success and failure. Recognizing the failure modes—in both the value proposition and the value chain—is the first step. But if these challenges are to be managed, materials producers must continue the tactical launch planning that they typically do well and raise their game significantly in three major areas: strategic segmentation, market selection, and business-model creation. The companies that choose to focus on building institutional capabilities in these areas can create a strategic advantage in launch timing: avoiding the commercialization pitfalls can cut up to half the time required for a new material to succeed, and it increases the likelihood of adoption. Both of these factors will dramatically improve return on innovation spend, driving improved profits and stronger shareholder value.

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The growing demand for green

Recent McKinsey surveys confirm that the appetite for green products is starting to grow rapidly but varies across market sectors and geographies. Producers must embrace a more nuanced picture of what will work and focus on products that meet the right criteria and perform as well as conventional materials.

Hanns Martin Kaiser, Mehdi Miremadi, Christopher Musso, and Ulrich Weihe

Green materials have become one of the hottest topics in the chemical industry, representing a new horizon of performance and sustainability. However, the green road has proved a difficult one for most chemical companies. They have struggled with several issues: defining what green materials are (and confronting the risk of investing to create higher-cost products that consumers fail to recognize as green), determining how to produce and market them in a cost-effective way, and determining how to price them. Last year, McKinsey made a significant investment in two concurrent surveys—one of executives in product value chains and one of consumers—to help address some critical questions that we believe must be answered before green materials will enter mainstream use. The findings are contrary to much conventional wisdom, indicating that green is not a passing fad and that there is significant appetite (and even some willingness to pay) for materials that meet the right criteria and involve no performance disadvantages. As such, the green-materials movement may yet take hold, and chemical companies may ultimately profit from the trend.

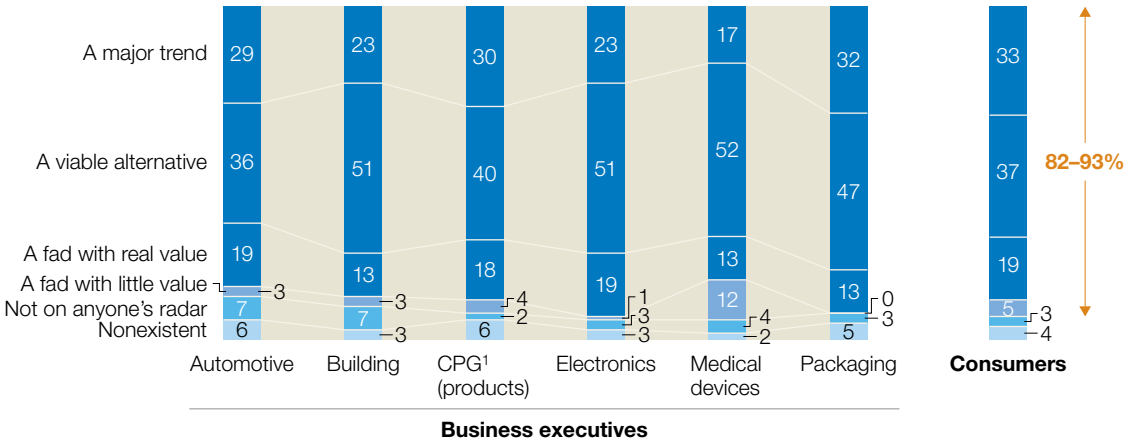
Survey methodology

McKinsey's survey of executives, conducted in summer 2011, included 500 respondents around the world who had influence on the selection and use of chemicals and plastics and participated in one of six major industries: consumer goods,

Exhibit 1

Green materials are being embraced as a viable alternative.

Current movement toward green materials in my industry is . . . , %



[1]Consumer packaged goods.

Exhibit 2

Industry executives regard recyclability and low toxicity as the most important green attributes.

%

	Global	By region: Asia[1]	Europe	United States[1]
Recyclable	28	22	27	32
Bio-based	12	19	15	6
Low carbon footprint	10	11	8	10
Biodegradable	15	19	19	10
Low toxicity	23	20	19	28
Recycled material	12	10	12	13

[1]Figures may not add up to 100% because of rounding.

packaging, automotive, medical devices, electronics, or construction. The consumer survey focused on 1,000 consumers in the United States and the European Union. Both surveys revolved around questions related to green products, including the definition of green, the viability of the trend, factors limiting adoption, and willingness to pay (by product type). Because environmental awareness is generally seen as a positive trait, consumers often overstate their willingness to pay more for green products, creating an overoptimistic pricing bias; the consumer survey was designed to eliminate that tendency as much as possible.[1] The executive survey also included questions about profit expectations from green products and customer willingness to pay.

Key findings

Analysis of the survey results uncovered a number of findings, some of which were counterintuitive. Five of these findings are especially notable.

Green is here to stay

Executives and consumers both see green as an important trend—a viable alternative to standard materials—that stands to generate value (Exhibit 1). More than 80 percent of executives in the surveyed industries hold this view. An overwhelming 90 percent of consumers agree.

Moreover, comparing these findings with those from a 2007 McKinsey survey[2] suggests that the interest in green products is growing rapidly and beginning to have a broader impact on consumer behavior. In the 2007 survey, although the vast majority of consumers admitted to being concerned about the environmental impact of their purchases, just one in three said they were ready to buy green products or had already done so. In the latest consumer survey, more than four in every five said that they consider the greenness of a product in their purchasing decisions. Given that green products are rarely inexpensive, the growth in importance of these factors during a harsh economic climate in much of the developed world indicates that green is no passing fad.

Defining green: End of life is more important than origin

Products often identified as green include those that are recyclable, biodegradable, or bio-based and those that have a low carbon footprint, are made from recycled material, or have low toxicity. Chemical companies have made claims about all these attributes, to different degrees, in the quest to be green. The overall survey results show that both consumers and executives attach greater significance to end-of-life green attributes than to the original source. For example, more than half of consumers said that recyclability is the most important green attribute, but only 4 percent were equally concerned that the product itself had been recycled. This finding is relevant for many chemical companies as they consider the trade-offs among different attributes for products sold worldwide.

Responses to this question from industry executives varied by geography. In Asia and Europe, different attributes were rated as being of relatively equal importance (Exhibit 2). For example, in Asia, 22 percent of the executives surveyed viewed the recyclability of a product as its most important attribute, and a similar proportion—19 percent—emphasized the significance of bio-based products derived from renewable resources. However, in the United States, there was much greater variance. Recyclability was thought to be far more important than other attributes.

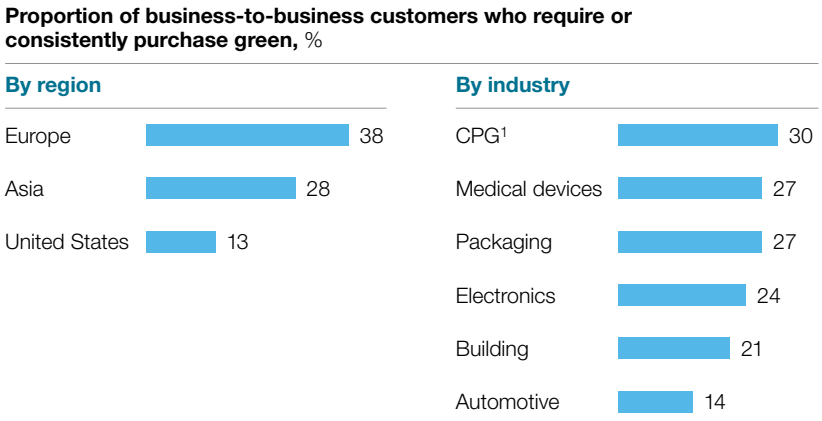
[1] The consumer survey included an iterative set of questions on pricing that allowed us to use conjoint analysis on the data. By ensuring that respondents were asked questions from several different perspectives, we were able to derive a clearer picture of their real willingness to pay, including inflection points. This helped to modulate the notoriously optimistic price bias that green surveys have previously shown.

[2] For more, see Sheila M. J. Bonini and Jeremy M. Oppenheim, "Helping green products grow," October 2008, mckinseyquarterly.com.

Exhibit 3

Demand for green products varies by region and industry.

Demand for green products according to executives



[1]Consumer packaged goods.

Green enthusiasm varies by segment

Attitudes about green products vary depending on where executives and consumers live and on the type and quality of product they are purchasing. Those in Europe are far more enthusiastic about green products than their counterparts in the United States. According to the executives polled, 38 percent of European business buyers require or consistently purchase green products, about three times the percentage in the United States. Similarly, executives in the materials supply chain have noticed that among their purchasing counterparts, interest in green products is greater in certain customer-facing industries than in others (Exhibit 3). For example, executives estimate that almost one in three customers in the consumer-packaged-goods industry has a significant attachment to green products. They also believe that buyers of high-quality and "in vogue" products are more likely to respond to the green message.

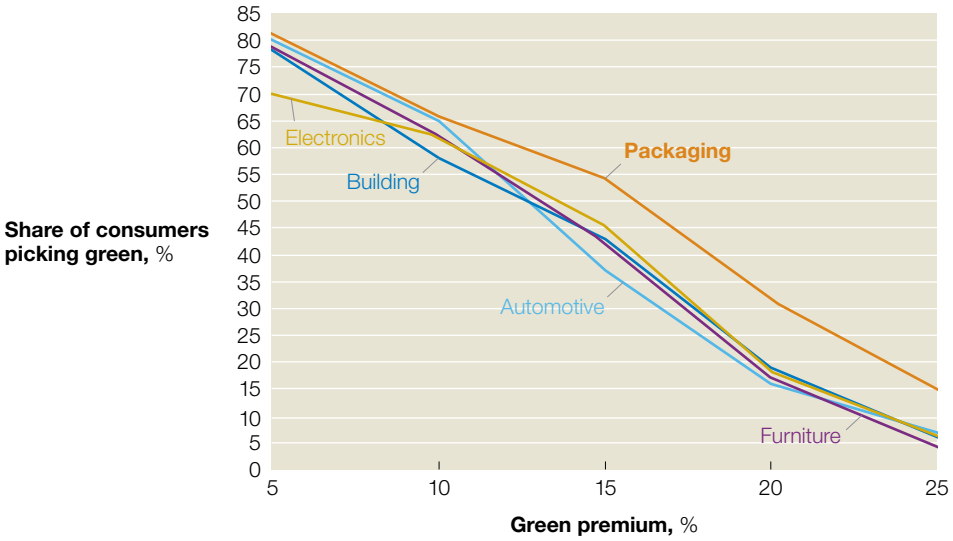
There was little correlation between the importance of green and a consumer's age, income, or education level. An examination of our US consumer survey showed that political leaning does have an impact on consumer attitudes toward green: using green products is more important to liberals than to conservatives and moderates. However, if green were solely, or even predominantly, a liberal issue, it would not be affecting overall consumer behavior to the extent revealed by our survey. Indeed, what is perhaps more striking is the significant proportion of moderates and conservatives prepared to pay a premium for green products.

It is therefore clear that there are nuances in the definition of green, in what matters most in different application segments, and in the preference for green, as well as in the perceptions of different customers in different geographies. These nuances imply that companies targeting

Exhibit 4

Consumers are willing to pay the highest green premium in packaging.

Share of consumers picking green by premium



this space may benefit from taking a more sophisticated and segmented view of their target markets as a way to drive adoption.

Consumers will pay a premium for green—up to a point

How is the trend toward green affecting consumers' behavior, most specifically by measures such as the premium they are prepared to pay for green products?

More than three out of four consumers said they would pay 5 percent more for a green product than for its nongreen alternative, all else being equal (Exhibit 4). A premium of 10 percent would still be acceptable to the majority (55 percent). As expected, the proportion of consumers picking green over standard products falls as premiums rise.

Nevertheless, a sizable group of green enthusiasts maintained that they would pay a premium of 20, or even 30, percent. For example, 17 percent of packaging consumers and 12 percent of electronics consumers would pay an additional 30 percent for a green product.

Previous research of this type has shown that consumers are less likely actually to pay a premium than they claim when answering questions in a survey. Although people like to tell themselves and others that they are environmentally aware, they will not part with their cash so easily when their concern is actually tested. While this may be true on an absolute basis, the findings of this survey are still vitally important, because they show a steep (and nearly linear) drop-off in applicable market as the green premium increases. This contradicts the common

claim that "consumers simply will not pay more for green"; the critical issue is not that consumers will refrain from paying more but rather that the size of the available market shrinks significantly as the price increases. As such, the broad markets that companies have traditionally addressed are smaller than originally assumed, requiring business plans that are attractive even when the addressable market is more targeted.

Green products must earn profits for the whole value chain

Our industry-executive survey—in which participants had no reason to overstate the consumer premium for green—corroborated the claim that portions of the market will pay more for green products. In fact, executives in both the packaging and electronics industries said that 17 percent of end-market consumers will pay a premium of at least 30 percent for green commodity products, and possibly more for particularly high-quality or in-vogue products. Overall, executives estimated that consumers will pay an average premium of between 12 and 22 percent for various types of green products across regions (Exhibit 5).
It should be noted that the premium indicated reflects what is gained through the green attributes provided to the end product by the component or ingredient that the surveyed executive sells; it does not refer to the premium that consumers will pay for the end product.

When it comes to the premium that executives said they would be willing to pay for the green materials they source, the value is significantly lower—only 6 to 13 percent. The substantial difference between this level of premium and the premium that executives have observed that consumers are willing to pay for green (12 to 22 percent depending on the industry and product type, as noted above) may underline the fact that value-chain players expect to profit from green.

While one would expect the value chain to demand some margin spread on green materials to justify the risk and investment required to orient the overall business toward green, the magnitude of the spread (6 to 9 percent, or the difference between the executive sourcing premium and the consumer premium) is surprising. If the slope on our consumer survey illustrated in Exhibit 4 is accurate, the value-

Exhibit 5

Executives expect consumers will pay more for green products, particularly in the premium category.

Level of additional outlay that consumers are seen as willing to make for green (commodity product vs premium product), %

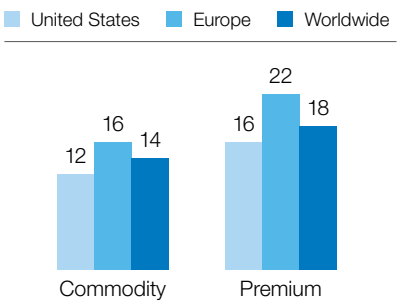
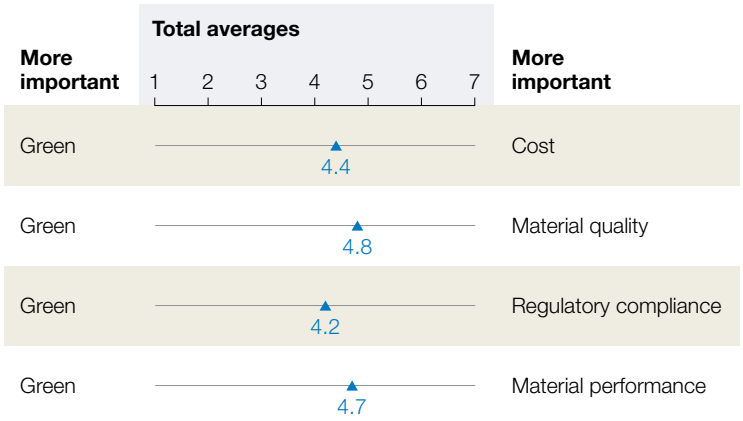


Exhibit 6

Industry executives give more weight to nongreen attributes.

When considering what material to purchase, how important is green in comparison with the following attributes?



While green attributes are taken into account, industry executives give more weight to nongreen attributes such as cost, material quality, regulation, and performance

chain profit expectations may be reducing the overall applicable market size for green materials by 20 to 40 percent.

The barriers to green

Material performance, material quality, and overall cost are the three greatest barriers to the adoption of green products. The findings on material performance and quality are straightforward: for consumers to feel comfortable paying a premium, the green product cannot be in any way inferior to its nongreen equivalent. Almost one in three consumers responded that lower performance or lower quality prevented them from purchasing more green products.

Executives think along the same lines (Exhibit 6). More than half said that concerns about performance and high cost limited their adoption of green materials. Indeed, executives ranked critical nongreen factors—such as quality, performance, and cost—as more important in their purchasing decisions than green factors. The green revolution may come, but it is clear that nothing, apart from a small cost premium, will be sacrificed for it.

The findings on cost require more interpretation. Despite a willingness to pay a modest premium for green products, consumers and executives both seem to feel that the higher cost of many green materials places them well out of their comfort zone. In fact, 77 percent of consumers surveyed say that the significantly higher cost of green products prevents them from purchasing more of them. This may indicate that the available offerings and applications that meet performance requirements are simply too expensive to be justifiable to most buyers.

Implications for producers of green materials and chemicals

The potential market for green materials is large and growing. Moreover, as our results indicate, there is a widespread readiness to pay a premium for green materials in many sections of modern

Recyclability is viewed as the quintessential green attribute in many parts of the world, and materials that do not fit into existing recycling streams may face adoption barriers

society, regardless of geography or industry. This clearly points to a potentially significant profit opportunity for chemical players. However, the green space is much more complex than most companies give it credit for; this is likely limiting the adoption of existing products and the appetite to develop more. If green materials are to succeed, their developers must change their approach to both development and commercialization.

Development: Matching performance

It is clear from both our survey and the market experience of many green materials that consumers and value-chain players will not sacrifice performance for greenness. Furthermore, executives and consumers alike state that performance concerns (and not higher costs) are the biggest barrier to further adoption of green materials. As many developers of polylactic acid (PLA) polymers will attest, seemingly minor performance deficiencies (such as noise in chip-bag applications) can severely retard adoption. As such, instead of attempting to launch materials that require users to lower or otherwise compromise their performance requirements in the name of green, chemical companies should focus their development efforts on products that are not susceptible to such trade-offs (or, ideally, that actually benefit from green sourcing).

Some companies, such as Dow Chemical and Braskem, have recently launched materials that come from greener sources (such as bio-based ethylene) but that have the same uses as conventional materials and can be recycled in the same way. Assuming that green materials can be made at an appropriate cost, this appears to be a reasonable path. While some may dispute the green credentials of these chemicals, it is likely that the vast majority of consumers will welcome this development—and that a good portion of them will pay a premium for these materials. We expect other companies to follow this path.

Finally, given that consumers and value-chain players put such value on recyclability, it is inadvisable to focus solely on sustainable-source claims—for example, emphasizing that something is bio-based. Recyclability is viewed as the quintessential green attribute in many parts of the world and among consumers and executives alike. In fact, it is likely that materials that do not fit into existing recycling streams will face significant adoption barriers. To ensure successful uptake, this key finding should be at the heart of efforts to develop green materials.

Commercialization: Choosing the right markets and value chains

Chemical companies must be selective about which application markets to launch into, focusing on those that will be most profitable (that is, where there is the greatest willingness to pay a premium) and quickest to adopt. While our surveys revealed a general trend toward increasing adoption of green materials in

all major product types and geographies, it appears that market segments that use a large amount of disposable material—such as packaging, electronics, and consumer products—are most amenable to (and most likely to pay a premium for) green-materials attributes. Other segments, such as automotive, construction, and medical devices, appear to respond better to broader green attributes, such as energy efficiency and fuel economy, than to the recyclability and sustainability of the material itself. It also appears that Europe and developed Asia are more aware of and attracted to green claims than much of the rest of the world, including North America. Understanding these market differences, at an application-specific level, is key to driving the successful adoption of green materials.

The finding that value-chain players expect to make outsize profits on green materials is a critical one. It indicates that green-materials producers must be both strategic and selective in their dealings with value chains. They should launch products in applications with relatively short value chains to minimize profit stacking. While conventional wisdom asserts that brand owners and materials producers should be the main beneficiaries of green properties, the buildup of price as players across the chain extract margins can limit adoption of green materials by driving up the ultimate price to consumers. Strategic moves, such as risk sharing or even outright acquisition of value-chain players, can also help minimize this effect and are likely to help green-materials producers capture more of the profit that their products create.

• • •

While there are pockets of success in green materials (for instance, the "PlantBottle" and PLA cold-use thermoformed packaging), the space is nascent. The markets are excited, available, and willing to pay a premium. The winners will learn from the current state of the space and move quickly to seize the opportunity.

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Winning in India:
The specialty-chemicals opportunity

Long seen as challenging and lacking scale of opportunity, India's specialty-chemicals potential is increasingly being recognized by international players. Companies must embrace a number of India-specific approaches to succeed.

Avinash Goyal, Suyog Kotecha, Saikiran Krishnamurthy, Neelesh Mundra, and Ulrich Weihe

For international chemical makers that have set out to tap the growth opportunity of Asian markets over the past decade, India has tended to be in China's shadow. In 2010, China overtook the United States to become the world's largest chemical market, with India ranking only eighth. Not only is China already a much larger market than India, but it also offers similar growth rates and the same order of capital-expenditure and labor-cost advantages. Recent major investments in China are a veritable roll call of leading international chemical players.

Leaving aside the greater allure of the Chinese market, many international chemical companies have in the past chosen to take a pass on India. In petrochemicals, India has no feedstock advantage, in contrast with production in the Middle East, which is conveniently located to serve the Indian market. As a result, petrochemical capacity additions now under way are driven by local players, a mix of private-sector and government-owned companies that split India's 4 million tons per year of ethylene capacity between them. To put that figure in perspective, global capacity of ethylene is 147 million tons per year. The United States has 27 million tons per year, and China's capacity has grown to 16 million tons per year.

Conditions for international players to enter India's growing specialty-chemicals market are

also challenging at first sight. India has a modest chemicals infrastructure on which international companies can build. Recognizing this, the Indian government has attempted to address the problem: in 2007, it announced five Petroleum, Chemicals, and Petrochemical Investment Regions. To date, only one of the five—Dahej, in Gujarat—has made progress; the region is already India's most developed for chemicals investment and home to 50 percent of the industry.

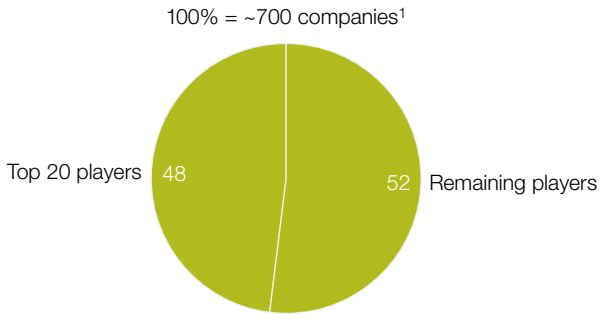
As a result, international companies face handicaps when contemplating large-scale direct investment in specialties. Take the case of surfactants based on ethoxylates: most Indian ethylene oxide (EO) output is dedicated to monoethylene glycol production, with only Reliance Industries' plant at Hazira, in Gujarat, having substantial EO volumes available for other uses such as ethoxylation. A wide range of other building blocks for specialties production, including oxo-alcohols, vinyl acetate monomer, phenol, propylene oxide, and H-acid, are only produced in limited volumes in India; acrylic acid is not yet produced. Power shortages are endemic. Given these issues, investments from international companies have tended to be small-scale.

Entering the Indian specialty-chemicals market through M&A also presents challenges, and there has been no activity in chemicals to match the acquisitions of Indian generic-pharmaceutical makers by international companies, such as Abbott Laboratories' $3.7 billion purchase of Piramal Healthcare. In chemicals, the limited number of sizable acquisition candidates has been a key reason. India's specialty-chemicals industry is highly fragmented, and it mostly comprises smaller companies with sales of less than $300 million per year (Exhibit 1). In addition, most Indian chemical companies, even those that are publicly traded, are controlled by families. In the rare cases in which families want to sell, acquisitions often follow a less direct route than in Western countries, with negotiations tending to be drawn out over several years.

Exhibit 1

India's specialty-chemicals landscape is fragmented.

Market share by revenue, 2010, %



[1]Additionally, 300–400 small players exist in the market.

Source: Prowess; Dealogic; press search; company Web sites; Global Insight; McKinsey analysis

These conditions are reflected in the limited level of chemicals M&A over the past decade (Exhibit 2). With the exception of the $350 million takeover of Micro Inks, India's top inks maker, by Germany's Huber Group (a transaction completed in multiple steps from 2004 to 2009), foreign M&A activity in Indian specialty chemicals has consisted of small-scale deals worth less than $100 million. Huntsman, for example, has made two small acquisitions, both in Gujarat. In 2009, the company bought a dyes plant to access low-cost production for its global dyestuffs business and to better position itself to serve the Indian market; in 2011, it bought Laffans, a surfactants maker with ethoxylation capacity located close to Reliance's Hazira plant.

Inflection point: time to look again at India

Despite these challenges, many international companies are starting to look again, and more closely, at the Indian specialty-chemicals sector—and with good reason.

First, the growth potential for India's economy over the next decade and beyond is well-known. GDP is expected to rise between 5 and 8 percent per year over the next five years, while the Indian middle class could increase from 46 million households in 2010 to 148 million households by 2030, with quadrupled consumption. Such developments put India on track to experience the kind of economic liftoff seen in China since the early 2000s.

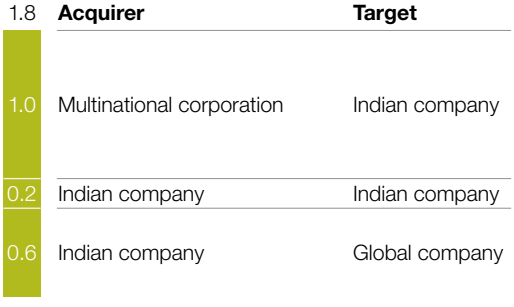
Second, the specialty-chemicals sector in India is picking up momentum; its compound annual growth rate (CAGR) rose to 13 percent from 2005 to 2010, a marked increase over its CAGR of 10 percent from 2000 to 2005. Certain subsegments have exceeded that average: crop-protection-chemicals sales have doubled since 2005 to about $3.5 billion, with growth in export sales (accounting for approximately half of the total) outpacing buoyant domestic sales.

Third, a number of domestic and international companies are already seeing healthy growth and returns in the Indian specialty-chemicals sector (Exhibit 3). The sector's largest companies, Asian Paints and United Phosphorus, have achieved

Exhibit 2

M&A activity in specialty chemicals has been limited.

Total deal value, 2000–10, $ billion



Source: Prowess; Dealogic; press search; company Web sites; Global Insight; McKinsey analysis

a CAGR in the 25 to 30 percent range over the past decade (see also "An Indian specialty-chemicals success story: An interview with United Phosphorus Limited's Jai Shroff," p. 40). Some of these companies are riding growth inside India, while others are leveraging India's low-cost production base to feed global businesses. United Phosphorus, India's biggest crop-protection-chemicals producer, employs the latter approach, with 80 percent of its sales outside India; other companies, such as Kiri in dyes and Sudarshan in pigments, have more recently launched aggressive drives to build international businesses.

International companies account for 5 of the 10 largest players in the Indian specialty-chemicals market, and this group of leaders has been achieving high growth. The international lineup includes Syngenta and Bayer, both among the top four players in India's crop-protection-chemicals market, with long track records in the country; Kansai Paint's Kansai Nerolac subsidiary; BASF, which saw its 2009 takeover of Ciba significantly expand its India presence; and DuPont, which has grown organically over the past two decades to become a top player. International companies' share overall of the Indian market rose from 11 percent in 2000 to 20 percent in 2010.

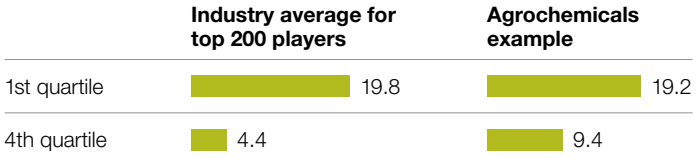
Fourth, microeconomic analysis makes the case for major growth potential across the specialty-chemicals industry. A detailed analysis of 15 specialty-chemicals sectors and an evaluation of the potential for Indian consumption and usage intensity to reach levels seen in China suggests that the Indian specialty-chemicals industry could grow four- or fivefold by 2020, to become a market worth from $80 billion to $100 billion per year. With growth of this magnitude, the existing landscape is likely to be completely redrawn, opening up opportunities for newcomers (Exhibit 4).

A key insight from our work is that this potential will be driven not only by underlying end-market growth but also by increased usage intensity and new product specifications and standards. The intensity of usage of specialty chemicals in India is at a much earlier stage of development

Exhibit 3

Top performers earn attractive margins in the industry and across segments.

Median EBITDA,[1] %



[1] Earnings before interest, taxes, depreciation, and amortization.

Source: Prowess; Dealogic; press search; company Web sites; Global Insight; McKinsey analysis

Exhibit 4

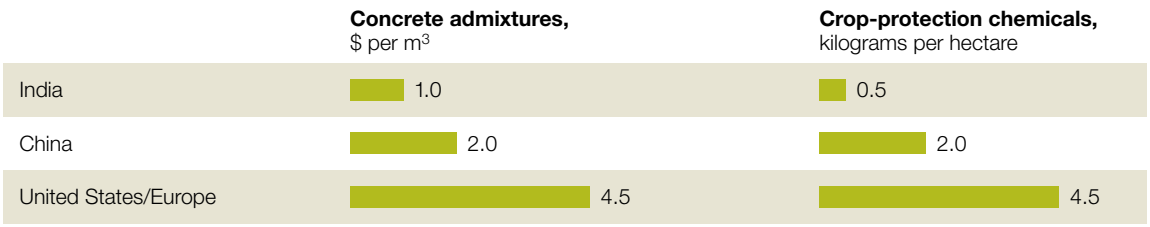
Factors driving specialties growth potential will vary by segment.

Segment	India 2010, $ billion	Growth drivers evaluated: Key end markets	Adoption level[1]	Impact of consumer standards	India 2020 potential, $ billion
1 Paints and coatings	3.1	Construction, automotive		High	12.5–16.5
2 Dyes and pigments	3.5	Textiles, exports		Low	10.0–14.5
3 Agrochemicals	3.4	Agriculture, exports		High	11.0–14.5
4 Specialty polymers	2.0	Packaging, automotive		High	8.0–9.2
5 Plastic additives	0.8	Pipes, automotive		Medium	2.3–3.2
6 Construction chemicals	0.5	Infrastructure, real estate		High	2.0–3.0
7 Home-care surfactants	1.0	Laundry care, dishwashing		Low	2.1–2.8
8 Textile chemicals	0.7	Apparel, technical textiles		Medium	2.1–2.5
9 Flavor and fragrances	0.4	Food processing, personal care		Medium	1.1–1.5
10 Water chemicals	0.5	Industrial water, municipal water		High	1.5–2.0
11 Cosmetic chemicals	0.4	Bath and shower, hair care		Medium	1.3–1.8
12 Paper chemicals	0.4	Printing, packaging		Low	1.2–1.8
13 Printing inks	0.4	Publication, packaging		Low	1.1–1.6
14 I&I[2] cleaners	0.2	Food processing, hotels		High	0.8–1.2
15 Rubber chemicals	0.2	Tires and tubes		Medium	0.5–0.7
16 Others[3]	5.0				20.0–30.0
	Total: ~22.5	**CAGR:[4] 13–17%**			**Total: ~80–100**

[1] Defined as a % of India's usage levels of end-market products or chemicals as compared with China.
[2] Industrial and institutional.
[3] Includes adhesives and sealants, food additives, electronic chemicals, water-soluble polymers, mining chemicals, oil-field chemicals, lubricating oil additives, and so forth.
[4] Compound annual growth rate.

Exhibit 5

Penetration of specialty chemicals is low relative to both the developed world and other emerging markets.



Source: Industry interviews; McKinsey analysis

than in Western markets and China, creating significant scope for growth (Exhibit 5). For example, as India's construction and real-estate industries see how concrete admixtures can help reduce maintenance and repair costs, there is potential to at least double the intensity of admixture use in the country.

The adoption of new product specifications and environmental standards also has the potential to boost specialty-chemicals usage. In water treatment, for example, expected tightening of India's municipal water-pollution norms is likely to increase water-treatment-chemicals usage substantially. Moving from concentration-based standards to pollution-load-based standards with tighter limits for industrial effluent is likely to further increase water-treatment-chemicals usage.

If the Indian specialties industry can capture the potential of these sectors, it could become the most attractive specialty-chemicals growth market in the world over the next decade (Exhibit 6). As noted earlier, a few international companies are strongly positioned as India's specialty-chemicals growth picks up speed. Most, however, are in one of three camps. First, there are companies with long-standing Indian businesses, which have seen limited recent growth. Second, there are companies that have made preliminary steps with small investments or acquisitions to get a toehold—and that now need to reset their Indian operations. The third and largest group has little or no presence, often trying to cover India from their regional headquarters elsewhere in Asia. All these companies have much to gain from greater engagement in India.

Key success factors

What lessons can we learn from the success stories of the Indian specialty-chemicals industry, and what should international companies seeking to capture the Indian growth opportunity do? We have observed five key success factors.

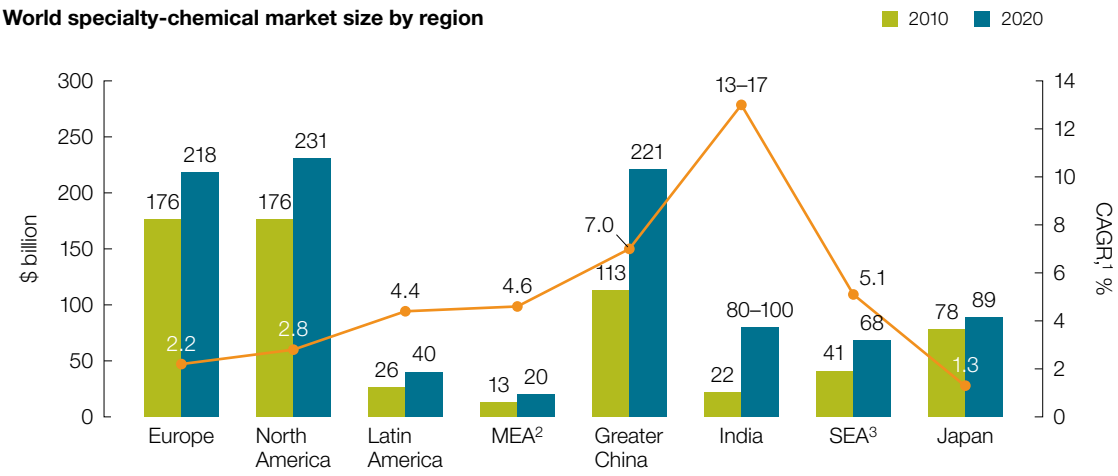
1. Set high growth aspirations and empower the top-management team.

   Given the fivefold market expansion expected in Indian specialty chemicals by 2020, companies should aim to grow by 20 to 25 percent per year to capitalize on the opportunity and to gain market share. However, these targets are much higher than those usually set by international companies.

Exhibit 6

If this growth potential is achieved, India will assume greater significance in the region and relative to other emerging markets.

World specialty-chemical market size by region



[1]Compound annual growth rate.
[2]Middle East and Africa.
[3]Southeast Asia.

Source: SRI; McKinsey estimates

To achieve this high aspiration, international companies must empower their top-management teams in India and develop their capabilities. Local management teams should be strategizing about how to tap the market, which cannot be done from regional headquarters in China or Singapore, and even less from corporate headquarters in Europe, the United States, or Japan. In particular, these companies should build strong business-development teams, which will give them local eyes on the market and feet on the ground. Creating such teams will allow companies to identify opportunities throughout India and across the fragmented lineup of local players, and thus to develop relationships and look out for partnerships and acquisition targets.

International companies with multiple business units may discover that some business units are too small to attract attention within the global parent-company structure or to have resources of their own to invest in India. In such cases, companies could assign or share the profit-and-loss responsibility with the Indian chief executive officer to drive growth in these areas and capture cross-business-unit synergies.

Companies must also work hard to attract the necessary talent to build up their business in India, and they must match salaries available in competing industries. Our research shows that even if chemical companies matched the higher salaries offered by IT companies in campus recruiting, their Indian engineers'

compensation would still be only one-third that of engineers in Europe. Recruits highly value opportunities for overseas assignments within a few years of being hired, and international chemical companies could increase their attractiveness by designing international career paths, which they are well positioned to do.

2. Invest in developing the market in India.

Many international companies underestimate the extent to which they must invest in market development to succeed in India. First, chemical companies must work with end-market players to educate them about the benefits that can be captured by using specialty-chemicals products; this education process is essential to facilitate the adoption of chemicals. Producers of engineering plastics, for instance, need to build contacts in India's fast-growing automotive industry—which is emerging as a world leader in small-car production—and they must show how their products' weight-saving properties can be put to use in new car designs to get their products specified in new models.

Second, international companies should develop local products at the right price to help drive demand growth. A large portion of emerging demand for specialty chemicals in India is in lower-priced segments. Companies should work, for example, with consumer-products companies that are tapping the "bottom of the pyramid" and bringing in new consumers who previously bought products made more cheaply without specialty chemicals or who did not buy products at all. These consumers represent a large new market: while a detergent formulated for such a market with 14 percent active detergent content instead of the traditional 17 percent content consumes less chemical per dose, it nonetheless represents substantial growth if the consumer previously purchased a product that did not include the ingredient at all. Similar dynamics are at work in industries such as automotive, construction, textiles, and dyes.

Third, companies should support the implementation of product and environmental standards for the benefit of society that will also institutionalize the consumption of more advanced specialty-chemicals ingredients or that will require more environmentally friendly specialty-chemicals end products for consumers. This can be achieved by working with specialty-chemicals-consuming industries and the government.

3. Develop a special business model for India.

The country's scale and differing levels of affluence and development make it difficult for international companies to replicate business models used in other countries, and companies must rethink their approach.

Distributing to major pan-Indian customers while meeting the needs of the country's fragmented and dispersed end-user markets presents a challenge. Companies must create a key-account strategy for large customers and partner with other companies and local distributors to build distribution networks across geographies, which would help them ensure coverage and reduce investment costs. In water-treatment chemicals, for example, companies should engage directly with big power-plant and paper-mill accounts, but they should also have a distribution network to address the mass market of small-scale water-treatment plants.

Supply chains in India can be complex given the fragmented and geographically dispersed market. Developing a strong vendor base, making tolling arrangements with cost-efficient local companies, optimizing the production footprint across India, creating an efficient logistics capability, and working with distributors are important to manage return on invested capital.

4. Leverage India's cost advantage by investing in production for export and in R&D.

There is significant potential for international companies to access India's low-cost manufacturing and research strength through partnerships and M&A. India has a large pool of skilled workers and competitive wage rates, while capital expenditure to build a plant can be 20 to 30 percent less than in developed countries. About half of India's crop-protection-chemicals production is exported; the country is also a major exporter of printing inks, pigments, and dyestuffs. Some international companies are tapping this opportunity: Syngenta, for example, is using its Goa facility to pioneer process innovations, and the site is one of its five main active-ingredient production hubs worldwide. But there is clearly substantial scope for India to become a global production base for other specialty-chemicals market segments.

About 80 percent of the Indian specialty-chemicals industry consists of small and midsize enterprises with subscale production facilities, and many companies lack the financial resources and management capabilities needed to increase capacity four- or fivefold to maintain their market share as the market grows exponentially. Some of these companies may be on the lookout for international partners, which offers a window of opportunity for global players.

5. Cope with the lack of infrastructure in India.

International companies must make a sober appraisal of the challenges of manufacturing in India and take these conditions into account in their business case. While plant-construction lead time in India is comparable with world benchmarks (or even shorter for some leading Indian players), and while capital expenditure costs are relatively low, specialty-chemicals producers face major challenges on access to intermediates (most of which must be imported), to reliable power, and to storage and distribution infrastructure.

There are clear advantages to selecting the sites that have the best infrastructure and that are close to reliable power suppliers and port facilities, such as those in Gujarat. For projects where dependable power is critical,

There are clear advantages to selecting the sites that have the best infrastructure and that are close to reliable power suppliers and port facilities

building a captive power plant—or at least backup power generation—should be part of the project blueprint. Companies with a product slate that requires building blocks not yet available in India should consider launching production of more downstream products, integrating upstream as appropriate chemicals become available (for example, EO derivatives rather than EO itself). Finally, companies should consider planning to hold a "safety stock" of key raw materials and include additional financing requirements in their overall business case.

• • •

One international chemical company has worked with an Indian tire producer for the past two years to incorporate its specialty fiber into a new radial tire designed to cater to Indian car buyers' demands; this initiative has already translated into tens of millions of dollars of new sales. Top-management teams at Western chemical companies are all too aware that emerging markets are on track to take an increasingly dominant share of global demand growth, and anecdotes such as this only reinforce the idea that they should engage more with the Indian market. Many senior-management teams would do well to keep in mind that their global market positions would be in much better shape if 10 years ago, when China was only the fifth-largest chemical market, they had recognized the true scale of the opportunity in China. As some international companies are showing, the Indian market offers a chance to get it right this time.

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An Indian specialty-chemicals success story: An interview with United Phosphorus Limited's Jai Shroff

United Phosphorus's CEO talks about his company's impressive story of international growth and prospects for the global crop-protection-chemicals industry.

Saikiran Krishnamurthy and Vipul Tuli

United Phosphorus Limited has grown rapidly over the past 15 years, from a niche specialty-chemicals player focused on the Indian market to the third-largest producer of generic crop-protection chemicals worldwide. This dramatic expansion has been achieved through a combination of acquisitions—40 since 1994—and strong organic growth.

What makes the United Phosphorus story stand out among Indian specialty-chemicals companies is that it has succeeded in taking its low-cost manufacturing base in India and bolting onto it the front-end components—product registration, marketing, and distribution—that are needed to take products directly to end-user markets. A number of Indian generic-drug makers have built global businesses. But in chemicals, with the exception of a few niche specialties producers, the game has been for Indian producers to act as contract manufacturers for Western players. In contrast, United Phosphorus has forward integrated to all key parts of the value chain, entering Western markets directly.

Founded in 1969 by Rajnikant D. Shroff to produce phosphorus and derivatives, United Phosphorus began to build its international presence in 1994 with the acquisition of UK-based MTM Agrochemicals, a small organophosphate-insecticides and herbicides maker. The company

then grew rapidly, acquiring businesses in other European countries, the United States, and Latin America outside Brazil, as well as a number of off-patent product lines from established pesticide producers. Its crop-protection-chemicals sales increased from $55 million in 1994 to $333 million in 2005. In 2006, United Phosphorus made its biggest acquisition to date with the purchase of pesticide maker Cerexagri from the French chemical group Arkema, nearly doubling its sales to $600 million that year. Also in 2006, it purchased seeds producer Advanta, establishing a presence in an increasingly valuable segment of the agricultural-inputs market.

Continuing acquisitions and organic growth propelled the company's sales to $1.3 billion in the fiscal year ending March 31, 2011, with a net profit of $117 million. In 2011, United Phosphorus acquired stakes in two Brazilian crop-protection-chemicals companies, Sipcam Isagro Brasil and DVA Agro do Brasil, establishing a position in that fast-growing market. United Phosphorus expects sales to reach $1.5 billion in its fiscal year ending March 31, 2012.

Jai Shroff, the elder son of the founder (now chairman), has been CEO since 1997 and has led United Phosphorus's rapid expansion. The company—in which the family holds a 27 percent stake, with the balance traded on the Bombay Stock Exchange—now has operations in more than 35 countries. He sat down recently at his Mumbai headquarters with McKinsey's Saikiran Krishnamurthy and Vipul Tuli to discuss his perspective on the company and its industry.

McKinsey on Chemicals: *What have been the key milestones in United Phosphorus's global growth story?*

Jai Shroff: Up until the early 1990s, our focus was mainly to service the Indian market in specialty chemicals and crop-protection chemicals, developing processes to make products in India for the first time. Our primary focus was on the industrial side of the business, and we concentrated our energies on developing efficient manufacturing facilities and production processes, supported by efficient utilities and backward integration on raw materials. All our discussions were about how could we make our products competitive and increase our manufacturing margins. In those days, it was relatively easy to earn a decent profit in manufacturing.

At the same time, we discovered that India really did have a competitive cost advantage in manufacturing. We built global-scale plants for some of our products, and this showed us how much of a competitive advantage we really did have and gave us the opportunity to go global in a number of product areas.

But in the course of the 1990s, the Chinese chemical-manufacturing boom happened, with expanded activities of Chinese state-owned chemical enterprises and exports to India. I don't know whether they were cheaper in their manufacturing costs, but they seemed less focused on generating a return on capital and making money.

With this onslaught, we had to change our strategy. Building on our competitive advantage in manufacturing, we decided to create a global platform with distribution and retail capabilities so that we could access the farmers ourselves and sell our chemicals to farmers under our own brand. Our thinking was that if you are in manufacturing, you get 20 percent of the total

margin. If you just distribute, you have 10 percent. But if you own the whole chain—the manufacturing, the regulatory package, access to the market, and distribution to the farmers—then hopefully you would make much better margins. So we started off in 1994 with the acquisition of MTM's business in the United Kingdom.

McKinsey on Chemicals: *Wasn't it a big gamble for a company of United Phosphorus's size to try to build a worldwide distribution platform?*

Jai Shroff: But what choice did we have? Roll over and die? I think the exciting part was that we confirmed with the MTM acquisition that we could make better margins in the business globally than in the Indian market, and we could make the approach work. Entry barriers to the crop-protection-chemicals sector in India in the 1990s were low, and growth in the Indian market in the 1990s was basically flat. In certain segments of the global business, in contrast, we found that we were able to make twice the net margins that we were making in our home market. So that confirmed our thinking that this was the path to follow, and we decided to pursue other European markets and the United States and grow our presence there.

So we've made a string of 40 acquisitions since—many of them smaller ones—and overall we've been very satisfied with the return on capital we've achieved. I think we have a different mind-set toward international growth: we have never seen operating in different parts of the world or owning international assets outside India as a barrier or as a particular risk factor, and we don't see travel time as a barrier. I set the example by traveling the most myself—six trips to Brazil in 45 days in early 2011. If I find my managers are not traveling, I ask them what's wrong.

McKinsey on Chemicals: *What is United Phosphorus's approach to making acquisitions?*

Jai Shroff: We are a serial acquirer, and we look at a lot of M&A projects. But because we're taking on so many risks when we acquire companies, we only buy them based on a very conservative business model. We don't borrow to make acquisitions and have never really considered a leveraged-buyout model. We always use our own cash flow to acquire companies and then refinance the acquisition after closing the deal. We also take a deliberately conservative view on returns. For instance, if the acquisition business model is showing a 20 percent internal rate of return (IRR), we always say, let's be more realistic and push it back to 15 percent for our financing model. Of course, when it comes to execution, we then target achieving a 30 percent IRR.

When we make an acquisition, we aim to integrate the business, including manufacturing, very quickly. Normally we transfer manufacturing to our plants in India to capture the cost advantage. We make detailed integration plans long before we close our deals. We set absurdly fast timelines for integrating businesses: eight weeks, three weeks, sometimes just seven days—certainly not months or years. Sometimes people cannot believe these timelines, but they learn to live with it.

We try to retain as many people as possible from the acquired companies because they bring a lot of value and teach us a lot about their markets. We brainstorm and work with them closely to

Jai Shroff

Vital statistics
Born 1965 in Mumbai, India

Married, with 3 children

Education
Graduated with degree in chemistry in 1988 from Mumbai University

Career highlights
United Phosphorus Limited (1988–present)

Global CEO (1997–present)

Executive director/ strategic direction and acquisitions (1994–1997)

Fast facts
Chairman, Advanta India

Chairman, Tatva Global

Founder, Jai Research Foundation

Board member, Asia Society India Centre

President, Basketball Association of Maharashtra

Young Presidents' Organization member, Mumbai and intercontinental chapter

see how we can speed up the growth of the business. This was particularly the case when we bought Cerexagri, a company that was earlier part of a large conglomerate. We looked at the numbers and realized that with some restructuring, refocusing, and portfolio tweaking, it could be a fabulous asset. We worked closely with the management team, and I think they really enjoyed the process.

McKinsey on Chemicals: *What have you targeted in shaping your portfolio?*

Jai Shroff: One key conviction is that we need to have a balanced portfolio, and we have worked to create that along two dimensions: geography and product range. We have done this because the fortunes of farmers' businesses—our customers—are highly weather related and tied to prices of agricultural commodities. These factors, in turn, decide the fate of our business. With the speed at which we have been growing, we have had to manage a lot of risk on our balance sheet and to be able to balance risk across markets. Having exposure to only one geographic market would create a much higher risk of failure for us, for instance, if the rainy season failed or there were other weather problems in that one market. To manage this risk, we have expanded worldwide. If you look at our business now, it's a very balanced portfolio with respect to geography: India, Europe, the United States, and South America are now all similarly sized, at 20 to 25 percent of sales.

We have also balanced our portfolio with our product range: 15 years ago, it was mainly insecticides, but now it is a roughly even split among insecticides, herbicides, and fungicides. We have deliberately avoided having one product becoming too dominant, and so were able to avoid the setbacks that some

competitors suffered when the price of glyphosate collapsed in 2008 and 2009.

Since 2006, we have further diversified with our entry into the seeds business, by acquiring Advanta. Obviously we realized this was an area that could generate future value, and we had been looking at the industry for five years when the opportunity to acquire Advanta came up. We decided to enter the bidding process and see if the business model would fit with our model. We saw it could be interesting but difficult; we even questioned whether we should go ahead because we were competing against some of the biggest industry names, and we were a smaller business then. As it has turned out, this is a fabulous business. It's not often you get really good assets like that, and valuations have since risen. Advanta has grown threefold since we bought it and clearly has the potential to grow 10 times that.

McKinsey on Chemicals: *What explains the timing of your Brazil acquisitions?*

Jai Shroff: We have been careful to make moves only when they made sense to us and fit our game plan and strategy, and only when we've decided it's a deal that we would love to do and we are going to enjoy growing the acquired business. We would never do a deal just because everyone else is buying into a market. In the case of Brazil, even though many other companies in our industry have had their highest growth rates over the past decade in that country, we did not acquire. Why? Because we could never find a good fit. Valuations were always wrong; either the market was booming and prices were too high, or the market was in such bad shape that target companies were going bankrupt and they desperately wanted to sell.

We've now decided to make an investment in Brazil because we think it has become a more mature market in terms of financial, legal, and operating systems and in terms of the scale and state of development of farming. The government's focus on agriculture is also totally different than it was 10 years ago, and the regulatory environment has changed: the government realizes that farmers need competitively priced crop-protection-chemicals products.

McKinsey on Chemicals: *Do you always move manufacturing to India?*

Jai Shroff: Usually we do. Just in terms of capital costs, we think we have an advantage on new plants of at least 50 percent compared with Western plants. That is backed up by our team of about 300 engineers and PhD chemists who are working on innovation—reengineering processes, working around existing product patents, or looking at innovations such as applying nanotechnology to microencapsulation techniques in product formulation.

But in a very few cases, we have not transferred production. Why not? Sometimes manufacturing

is strategically located with respect to raw-material supply or customers, and moving production to India does not make sense. Cerexagri's plant near Marseille, for example, consumes sulfur, which we source from the oil refineries close by. But the plant has still gone through our comprehensive cost-reduction analysis, and we are spending a lot of money on innovations to reduce production costs there.

McKinsey on Chemicals: *Where is the global crop-protection-chemicals industry headed?*

Jai Shroff: The generic sector is growing as a percentage of the total market; generics continue to gain market share as some of the bigger products go off patent. I think the research-based companies are becoming more innovative in the ways they defend market share. But on the other hand, they are also spending more money on the biotech and seeds side and less on chemicals research, so I think that the new chemical-product pipelines are not as strong as they used to be. With more products going off patent than new products being introduced, that translates into a bigger opportunity on the generics side of the business.

I also think that recent moves by Chinese players will create pressure on the generics industry to increase its margins. ChemChina will need to get a decent return on the capital it has invested to acquire Makhteshim Agan, and the government-led consolidation of Chinese generics makers should also be good for the industry. I expect continuing consolidation both on the generics side of the industry and among the research-based companies.

While we are seeing the research-based companies place emphasis on research and development for seeds, they are also making moves toward crop management rather than simply focusing on seeds. We compete with the research-based companies, but we also work with them closely on crop management and on pesticide-resistance-management programs, adding our portfolio of products to their range. Yes, we battle for the same customer, but if we can offer a solution together, we'll do that.

McKinsey on Chemicals: *What is the outlook for the Indian market?*

Jai Shroff: The Indian market is a much more important market for us now than it was 10 years ago—by far. The Indian market was a very stagnant and low-margin business for a long time, but over the past two to three years it has really been growing well. Food prices are generally higher, and the profitability of farmers is much better.

It's a complex market, because you're operating in the equivalent of as many as 20 different countries. Each province has different languages and work and cultural habits, and crop-wise we have such a huge variety. You can't duplicate the approach from European, US, or Brazilian markets where there are a few major crops and it's possible to be dominant with products for one crop. In India, we have many smaller crops and lots of very small farms. There are still huge segments of the Indian market that need to be developed, so there are a lot of opportunities.

The Indian market was never a major focus for us over most of the past 15 years—until just recently—but we've always been one of the biggest players here, and it's a competitive market that has kept us sharp. We're trying to find innovative ways to continue to grow and gain market share.

Over the past five years, our representatives in the field have more than doubled the already huge number of farmer meetings they hold. We are expecting our India business to grow as fast as the rest of our global business, so it will become a much bigger market, if not a bigger share in our portfolio.

At the same time, operating in India has changed. Environmental standards have risen a lot, exponentially, which is a good thing. Serious companies will stay in business, and not-so-serious companies will have to shut down. The government is also expecting companies to be more active in corporate-social-responsibility initiatives.

McKinsey on Chemicals: *Has United Phosphorus's transition to a much larger global company changed the way you manage?*

Jai Shroff: There was a time when I knew every manager and could work directly with most of them to solve problems. That's no longer possible. You have to let go of some things and move from intuition to following systems. Even today, when I walk around in a field in Australia, I can see enormous potential for growth, but now I know I need to get our managers fired up with the same passion for growth and the same desire to create opportunities. I am having to learn how to review all parts of the business in a systematic way and focus on a few areas. This is still a challenge; I don't think I've managed to do this fully yet.

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Using microeconomics to guide investments in petrochemicals

The shake-up of competitive dynamics under way in the global petrochemical industry has rendered traditional investment-planning approaches obsolete. Building margin-outlook scenarios from better insights into price relationships can help companies make the right investment decisions.

Scott Andre, Thomas Hundertmark, and Rajeev Rao

Accounting for about 40 percent of global chemical-industry revenues, petrochemicals are the industry's largest subsector and a key determinant of its overall performance. While the petrochemical sector has rebounded strongly since the 2008 financial crisis, it is facing discontinuities that have the potential to seriously affect the profitability of existing assets and new investments.

The first of these discontinuities is the higher price and greater volatility of crude oil—the primary driver of petrochemical costs and prices—which has not only changed price relationships among petrochemicals but is also promoting the adoption of non-oil feedstocks.

The second is the emergence of powerful new producers with different cost positions and decision-making mind-sets in regions such as the Middle East and China, changing the industry landscape. Just 15 years ago, chemical flows were mostly from North America and Western Europe to all other regions. They are now much more complex, directly affecting price differentials between regions worldwide.

Discontinuities are also emerging along the hydrocarbon and petrochemical chains. These include major shale-gas discoveries in the United States as well as initial indications of significant reserves in other parts of the world, oversupply of gasoline relative to diesel,

and global tightness of once plentiful by-product materials such as butadiene and propylene. Add economic-growth uncertainties and geopolitical risks, and decision making in petrochemicals can feel like placing bets in a casino.

These developments create particular challenges for petrochemical companies planning investments, because they mean that traditional ways of projecting margins for new plants no longer provide a reliable guide. Players used to be able to rely on historical margin patterns for guidance on future margins. That was a valid approach when past and future plants relied on the same basic technology built in the same region, and all players had similar capital-investment and return expectations. But in a globalized world, the new long-term price setter might be situated in a different region and operate under a different type of cost structure.

Applying historical product-to-feedstock price spreads to outlooks based on assuming a given margin or return for a given spread is also no longer a valid approach. This is because most spread analyses omit utility costs, which have risen greatly with oil prices in most regions and compressed margins.

Similarly, the traditional use of one to three outlook scenarios complemented by simple sensitivity analyses no longer provides a reliable guide. A few outlook cases cannot reveal the broad range of cash flows that variations in oil prices and globalization of production and demand can cause. At the same time, sensitivity analyses in a world of high oil prices must consider how changing one variable may significantly affect several other assumptions, which the traditional approach cannot capture.

And if the scenarios are purchased from a third party, the buyer usually has limited visibility into the variables underlying them, as well as into how changes in market conditions might spell success or disappointment for the investment.

In this new world order, what approaches and tools can be tapped to analyze basic topics such as price and margin outlook, investment evaluation, and capital allocation?

A fundamentals-based approach to evaluating investments

We believe that a rigorous microeconomic approach to understanding long-term pricing mechanisms of major raw materials and by-products for the relevant process or chain, combined with extensive scenario analysis on a scale well beyond that commonly practiced within the petrochemical industry, is essential to making investment decisions when faced with the challenges described above.

To understand pricing mechanisms, companies will need to go back to the basics of supply and demand, taking fully into account producer costs, substitution caps, and alternative production routes, as well as trade and logistical linkages between regions. The complexities of such analyses and the power of this approach can best be appreciated by looking at an example. Consider propylene in the US Gulf Coast (USGC). The price of propylene over the past decade has varied significantly, driven by increasing oil prices, refining yield shifts, changing demand patterns, and more recently, the shift away from naphtha cracking in the United States. Our microeconomics-based research has shown that over this period, propylene's price has moved between three pricing mechanisms: its alkylation

value, its netback from polypropylene (PP) when PP is priced at parity to high-density polyethylene (HDPE), and its netback from PP when PP is priced at parity to higher-priced resins like polystyrene (PS).

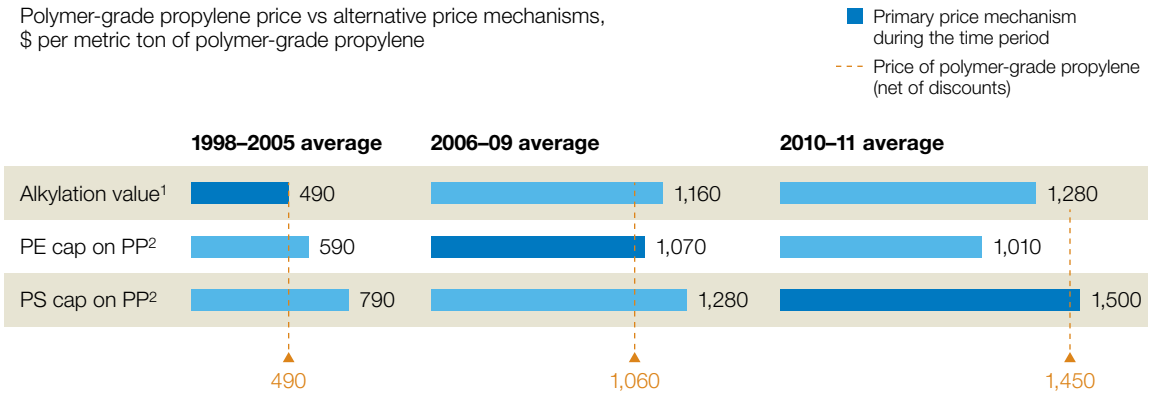
Two main developments drove the switches between price mechanisms. Historically, the USGC propylene price had been linked to its alkylation value. But when rising oil prices in the mid 2000s pushed the alkylation value higher, the propylene price detached from this pricing mechanism. The marginal use of propylene instead became PP substituting for HDPE, thus establishing the new pricing level. By 2010, the US propylene market had reached a major tipping point, becoming tight as propylene demand continued to grow faster than supply. In the new tight market, propylene moved up the value ladder to a higher rung, to the point where its price is being set by PP competing in certain applications with PS (Exhibit 1).

Looking to the future, all the aforementioned drivers of propylene supply and demand remain relevant, and therefore any of these price mechanisms are possible. In addition, two new possibilities emerge. New propane dehydrogenation (PDH) units must be built in the United States to maintain adequate supply, and thus long-term average propylene prices may settle close to full cost (cash cost plus reinvestment) of new US PDH units. Another possibility is that US propylene prices could end up becoming linked with Asian propylene prices through PP or propylene trade—with Asian propylene prices

Exhibit 1

Propylene's price in the United States has shifted across various price mechanisms.

Polymer-grade propylene price vs alternative price mechanisms, $ per metric ton of polymer-grade propylene



[1]The alkylation value shown here includes purification/transport cost to be comparable with price for polymer-grade propylene.
[2]Maximum price of polymer-grade propylene before polypropylene (PP) cost exceeds polyethylene (PE) or polystyrene (PS) price. These price mechanisms occur when the propylene supply is tight and its price rises to the highest price point where propylene demand declines to the point where it balances with supply. The PE cap on PP fell below alkylation value after 2005 primarily due to the microeconomic effects of higher oil prices.

Source: CMAI; McKinsey analysis

set by local mechanisms similar to the ones described for the United States above.

Therefore, any assessment of future prices of USGC propylene will have to take all these factors into account. Simply using historical price relationships to predict propylene prices is inadequate and could lead to significant errors.

Propylene is only one of several examples: our research suggests that many other petrochemical chains—for example, chlor-alkali, methanol, nitrogen, aromatics, and many thermoplastic polymers—could see dramatic changes in pricing mechanisms as a result of various similar discontinuities.

Once the microeconomic building blocks are in place, scenarios are constructed based on variable ranges that are microeconomically reasonable even if they have no basis in history. Margin-outlook "heat maps" are then developed to understand returns and identify those scenarios under which there is a substantial risk, so that the appropriate mitigation actions can be taken to minimize possible downsides.

It should be stressed that no amount of modeling is a substitute for sound managerial judgment. Tools like the heat map can generate a fact base for a detailed discussion, but the fact base should only be considered an aid in decision making, rather than a definitive conclusion or recommendation in itself.

Putting the approach to work: A case study

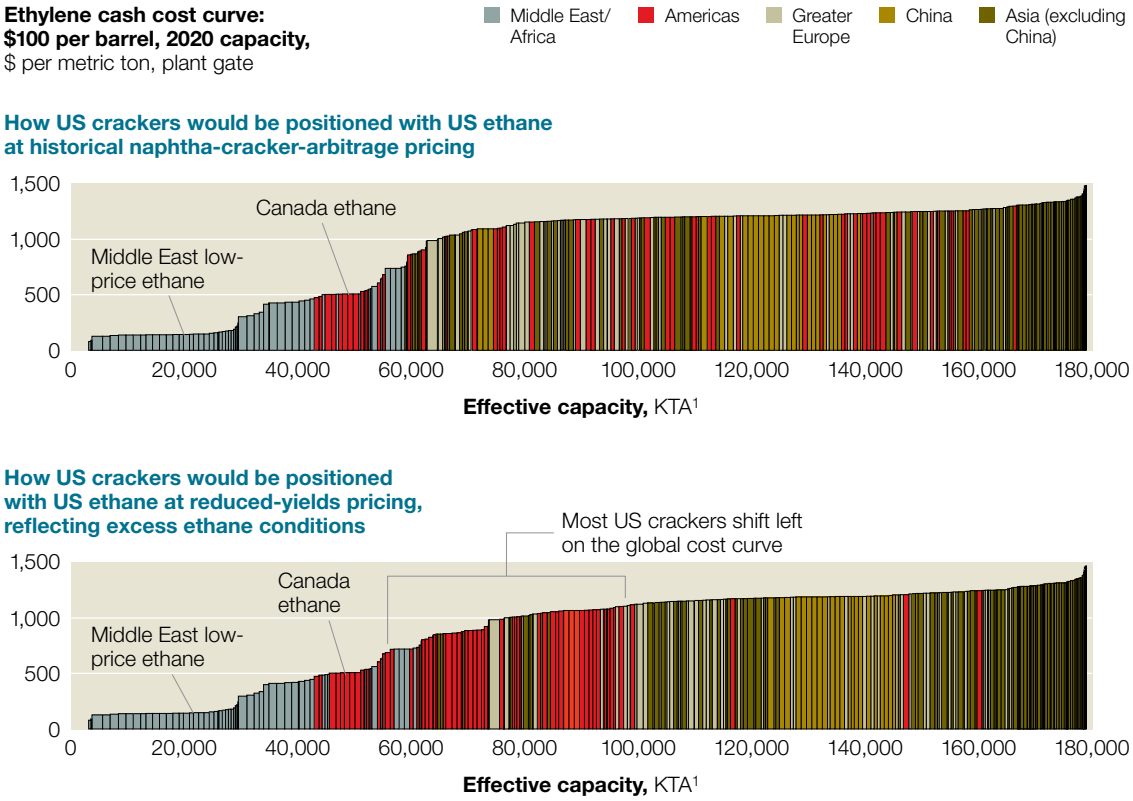
The application of the microeconomic approach is best explained by presenting an example. We describe here the highly topical case of an investment analysis for a hypothetical greenfield ethane-fed ethylene cracker and polyethylene complex in the United States.

As recently as three years ago, conventional wisdom suggested that it was unlikely that a greenfield world-scale ethylene cracker would

Exhibit 2

Excess ethane conditions in the US dramatically improve the competitiveness of US ethylene.

Ethylene cash cost curve: $100 per barrel, 2020 capacity, $ per metric ton, plant gate



[1]Thousand metric tons per annum.

ever be built again in the United States. However, the discoveries of abundant ethane-containing shale gas have now made US ethane-fed crackers among the most cost-competitive in the world (Exhibit 2).

Not surprisingly, a number of companies have announced ethane-based cracker projects. The key question that industry players are asking is, will this apparent "sure thing" hold up across the life of the new crackers—a life that usually lasts longer than 20 years?

The following describes how we used a micro-economic lens to create scenarios, and then assess margin outlooks under these scenarios, to aid in making the investment decision.

The price side

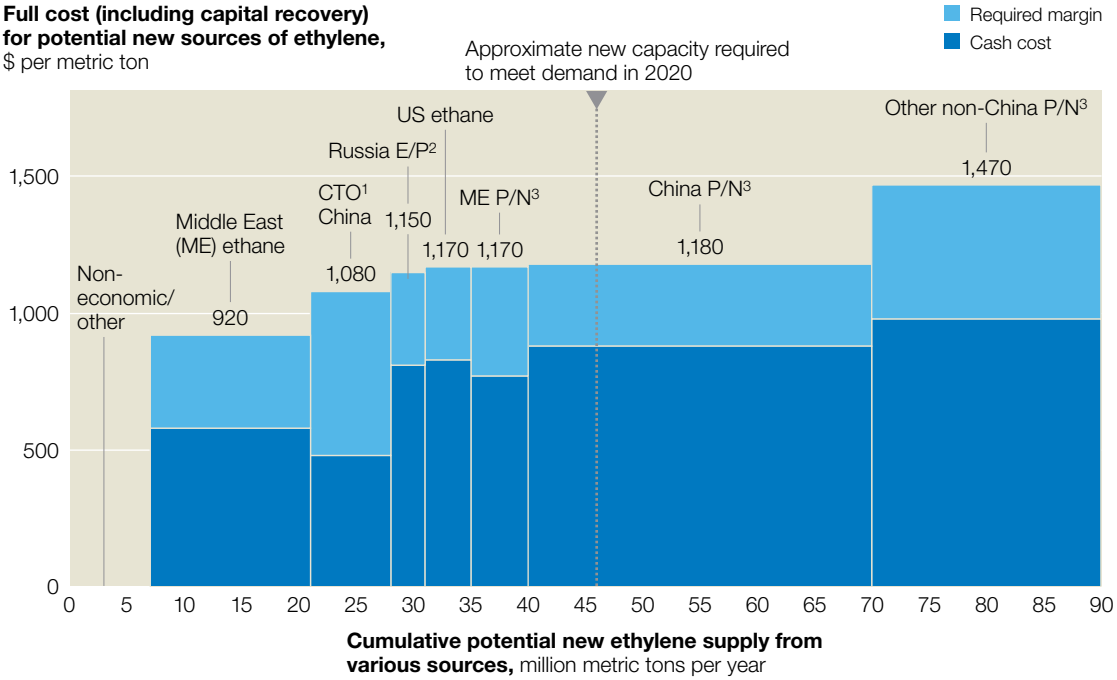
We assume that US ethylene prices will be linked to global ethylene prices via derivative trade flows, since the United States is expected to have significantly more ethylene capacity than demand as ethane-cracking capacity is added in North America. What will the long-term average price

of ethylene be? By 2020, global demand is likely to be 45 million metric tons per year higher than the current demand of 128 million metric tons per year. New low-cost supply sources (including new US ethane-fed crackers) will only cover part of that requirement, and new naphtha crackers will also be needed to meet demand. Building in China is the most cost-effective high-volume option for new naphtha crackers, positioning these plants as the global long-term price setter for ethylene and derivatives (Exhibit 3).

For investors to be incentivized to build new naphtha crackers in China, the price of ethylene has to be high enough for them to be able to earn their cost of capital and a satisfactory return. In the long run, therefore, we believe that the full cost (defined as cash cost plus the margin required for capital recovery) of building a new naphtha cracker and derivative plants in China will set the through-cycle average price of ethylene and derivatives in China—and by extension, price levels worldwide. The major drivers of China's full cost are capital

Exhibit 3

The 'full cost' cost curve suggests that Chinese naphtha crackers will be required to meet global ethylene demand.



[1]Coal to olefins.
[2]Ethane/propane.
[3]Propane/naphtha.

In the long run, the full cost of building a naphtha cracker in China will set the through-cycle average price of ethylene worldwide

costs, the price of naphtha (related to oil prices), and credits from major by-products such as benzene, propylene, and butadiene, which we now examine in turn.

Our research suggests that capital costs today for chemical plants in China can be 10 to 50 percent lower than those for equivalent plants in the West—the greater the local content, the greater the savings. Whether China will maintain its cost advantage over the next 20 years or lose it as living standards rise is an open question. But it is one that can be addressed by using scenarios to ascertain whether this uncertainty is a major factor in the attractiveness of a new US cracker investment.

The prices of oil, and by extension, naphtha are also highly uncertain, since they are affected by macroeconomic and political factors as well as cost. A range of prices can be used for scenario modeling, taking as a starting point an oil price of $80 to $100 per barrel,[1] which we believe represents the full cost of new crude-oil volumes.

For by-products, we will focus our discussion on propylene and butadiene, the price levels of which can have a major impact on ethylene pricing. This is because naphtha-based ethylene crackers generate substantial quantities of by-products, and the prices the producer receives for those by-products influence the price it needs from ethylene to reach a target return. Hence, if by-product prices are higher, the long-term price of ethylene—and thus polyethylene—can be lower.

As we described in our earlier discussion of propylene, forecasts suggest that demand for propylene will outstrip supply from traditional production routes and is likely to require on-purpose production in the future, using PDH plants. The same is true for butadiene, also using dehydrogenation. In both cases, these could become pricing mechanisms, and so we have included them in the margin models for Chinese and US crackers.

The models also incorporate a second possible future price mechanism: the potential for prices of both products to rise substantially, to substitution-based price levels. For example, in China, propylene prices have risen to a ceiling set by polypropylene cost, reaching parity with polyethylene price while propylene prices are set as a netback from polypropylene.

The cost side

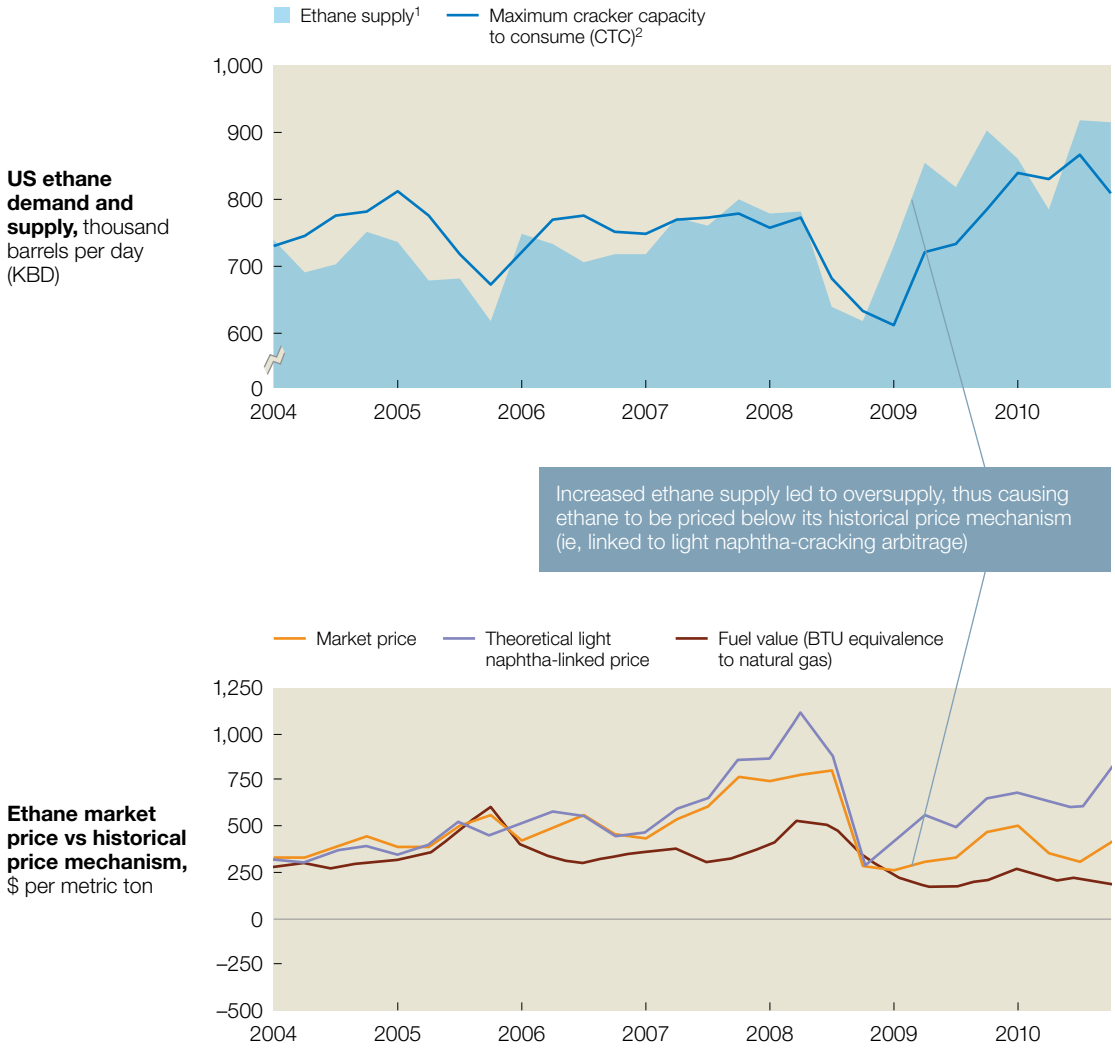
Moving to the cost side of the equation, we will focus on feedstock costs, specifically ethane, for the purpose of simplicity.

From the late 1980s through 2007, the US ethane price usually equilibrated at the level where flexible feed (flex) crackers were indifferent to using ethane or naphtha at design yields and throughputs, referred to as the “design yields” price. With the surplus of ethane from shale

[1] This figure is calculated in today’s dollars, plus future inflation.

Exhibit 4

US ethane prices have dropped as ethane supplies exceed capacity to consume ethane at normal yields and throughputs.



[1]Based on Energy Information Administration (EIA) data plus 20 KBD additional supply from refineries (above average 20KBD reported by EIA). Includes inventory removals.
[2]Based on highest (90th percentile) month's ethane consumption in each cracker multiplied by month's industry utilization for each year through 2007, adjusted for announced or estimated ethane-cracking expansions after 2007.

Source: US Energy Information Administration; *The Hodson Report*; Petral; McKinsey analysis

gas, however, ethane supply now exceeds the capacity to consume it all in crackers at design conditions (Exhibit 4). As a result, ethane prices have declined to the point where cracker operators can justify forcing in the excess ethane despite seeing lower ethylene yields and production rates from the ethane, resulting in the "reduced yields" price. And with the prospect of additional supplies of ethane arriving in the market before sufficient new cracker capacity is built to consume them, ethane's price could drop further—all the way to a floor set by fuel value, that is, equivalent to the price of natural gas on a British-thermal-unit basis.

Eventually, enough cracking capacity could be built to consume the available ethane supplies, leading to a rise in ethane prices. But the price might not return all the way up to the "design yields" price of ethane competing with naphtha. With all the new ethylene capacity, the United States will have to continue to export ethylene derivatives to Asia. Because of this, ethane prices will have to stay at or below the level where US crackers consuming ethane (both crackers that consume 100 percent ethane and crackers that consume a mix of ethane, naphtha, and other hydrocarbons) can compete in Asia.

Each of these future ethane price levels could prevail for extended periods of time over the life of the project. We have therefore modeled the three cases described above: first, at fuel value; second, at reduced-yield conditions (that is, at a discount to naphtha-cracking arbitrage); and third, at Asia netback.

Building the case

The above description of potential drivers affecting US ethylene margins yields a list of five key variables, each of which should be considered with a number of different values

Exhibit 5

Five key variables have been evaluated in our model.

Variable	Value
Crude oil	• Between $70 and $190 per barrel • Increments of $30 per barrel
US ethane price	• Fuel-value equivalence • Discount from naphtha-cracking equivalence • Netback from polyethylene exports to Asia[1]
China naphtha-cracker by-product credits	• Low values, ie, propylene at full cost from propane and butadiene at full cost from butane • Higher values, ie, propylene price is at a level where polypropylene is cost capped by polyethylene price, and butadiene price reflects moderate tightness (similar to recent years)
US naphtha-cracker by-product credits relative to China credits	• United States near or below China values, eg, netback from export of derivatives to Asia • United States above China values, eg, propylene at alkylation value
China capital costs	• 10% discount to Western costs • 50% discount to Western costs

[1]Asia polyethylene price netted back to the United States, less conversion costs of ethane to ethylene and ethylene to polyethylene. This represents the price of ethane if the capacity to consume exceeds supply and the ethane price rises to its maximum possible level.

(Exhibit 5). The analysis can be further expanded to include additional important variables such as natural-gas pricing mechanisms, naphtha pricing mechanisms, or gasoline-pool market dynamics. It would, however, raise the number of scenarios to several hundred, too many to explore in this paper but manageable for a full project assessment using this approach.

The variables list, in combination with an approach that generates the consistent microeconomics-driven prices series, is then

Exhibit 6

The variables list is developed into a sample heat map for a new US ethane cracker/HDPE.

Cycle average margins,[1] based on cost conditions in 2020, assumes 2015 build, $ per metric ton of HDPE[2]

China capital expenditure discount vs US	China cracker by-product price levels	US by-product price levels relative to China
10%	Low	High
		Low
	High	High
		Low
50%	Low	High
		Low
	High	High
		Low

Key assumptions for all cases
- 1,000 KTA[5] ethylene from ethane; 250 KTA HDPE
- HDPE set by export netback from China
- China HDPE price based on full cost (including margin required for 10% IRR) of new naphtha cracker and HDPE plants
- China by-products based on full cost of routes assumed to set price, eg, propane dehydrogenation for propylene, butane dehydrogenation for butadiene

[1]A change in margin of $100 per metric ton of HDPE represents a swing of about 3 IRR points.
[2]High-density polyethylene.
[3]US ethane price mechanisms: fuel value: ethane at equivalence to natural gas ($7.70 per million British thermal units in 2020 dollars); reduced yields: ethane at a discount to historical price relationship to naphtha, ie, advantaged cracking feed but not at fuel-value floor; Asia netback: ethane at a price in which flexible feed crackers (50/50 ethane/naphtha), integrated with HDPE, are competitive for exports to Asia but offer low margins for the cracker and HDPE plant.

used to develop margin outlooks, assembled here as a heat map (Exhibit 6). This more detailed examination of the project yields important additional insights that a conventional analysis would not provide. For example, under a scenario of oil priced at $100 per barrel and reduced-yield ethane in the hypothetical case we are considering, margins on the projected HDPE plant could vary by over $380 per ton, equivalent to more than 10 percentage points of the internal rate of return (IRR), as other variables change. This makes clear that the impact of the by-products

ILLUSTRATIVE

Margins in 2020 exceed level needed for 30% IRR[4]
Margins in 2020 would provide 20–30% IRR
Margins in 2020 would provide 10–20% IRR
Margins in 2020 less than level needed for 10% IRR

US ethane price[3]

Scenario 1: fuel value

Crude oil (2020 dollars), $ per barrel

70	100	130	160	190
503	857	1,208	1,560	1,910
502	854	1,206	1,558	1,910
315	619	923	1,228	1,531
314	615	916	1,218	1,519
315	667	1,018	1,369	1,720
314	666	1,018	1,369	1,720
171	476	780	1,082	1,383
170	471	773	1,074	1,375

Scenario 2: reduced yields

Crude oil (2020 dollars), $ per barrel

70	100	130	160	190
453	697	861	1,025	1,187
451	670	841	1,013	1,182
274	503	653	795	930
272	453	571	696	826
264	491	655	819	980
262	482	653	819	980
130	359	488	622	759
128	310	427	557	689

Scenario 3: Asia netback

Crude oil (2020 dollars), $ per barrel

70	100	130	160	190
117	88	104	122	145
136	140	142	145	154
264	279	291	292	299
283	349	414	466	508
305	311	327	345	368
324	328	330	345	368
408	423	435	468	494
427	493	587	602	638

[4]Internal rate of return, based on using this (nominal dollars, no inflation) for the life of the project.
[5]Thousand metric tons per annum.

and the capital productivity on the overall project economics could be significant. Had the prospective sponsor of a new cracker followed the traditional project-evaluation approach and considered only recent and historical through-cycle ethane-cracking margins or spreads between US ethane and naphtha, its analysis would have completely missed the other crucial variables and produced misleading results.

In light of all these considerations, is the project still a sure thing? In the illustrative case we are considering, only if it can move ahead quickly and outpace competitors. If enough ethane crackers are built so that ethane demand catches up with supply, ethane prices are likely to rise to an Asia-naphtha-linked price mechanism, and IRR could fall to below 10 percent. To be confident of longer-term returns in this scenario, investors must confirm favorable long-term price expectations for propylene and butadiene coproducts in Asia and in the United States. Under a scenario of Asia-netback-ethane price, oil at $100 per barrel, and a 10 percent China capital-expenditure discount, these coproduct factors could drive differences in margins on the HDPE plant of as much as $260 per ton, representing an IRR swing of about seven points.

The heat map and underlying data can be used by petrochemical companies in several ways. First, the analysis informs the investor of the conditions required to achieve attractive margins and forces a debate about whether these conditions are realistic, rather than blindly using the off-the-shelf forecasts available in the industry. Second, the analysis allows the investor to understand which combinations of variables have the greatest impact on project economics and to focus on designing risk-mitigation approaches accordingly. Finally, the analysis provides a fundamentals-based price-and-margin-forecast database under various combinations of input variables. The investor can use this database to build a cash-flow model in which input variables (and therefore price and margin forecasts) are changing over time in a way that more accurately reflects the investor's view of how the petrochemicals world will evolve, rather than using generic forecasts.

• • •

Players who have used these tools develop a greater appreciation for the risks they face and better understand how industry changes will affect their long-term prospects. We have seen companies that adopt this approach gain the confidence necessary to make step-out decisions, such as adopting new production routes or feedstocks—decisions that represent significant changes in direction and that position the company to be more competitive in the new era of petrochemicals.

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Spotlight

Improving return on sales by better managing small customers

Ingo Aghte and Georg Winkler

Many chemical companies wrestle with a large and complex portfolio of small customers that generates disappointing margins. Poor performance is often driven by two factors: service levels mismatched to the profitability of the customer and failure to leverage the full potential of distributors. But both of these factors can be directly attacked—and doing so drives substantial profitability improvement. Companies that have addressed these two areas have improved their overall return-on-sales performance by 5 to 15 percent within just 12 months.

Differentiated service levels:

Matching service to account profitability

Many chemical companies provide a large number of small, low-margin accounts with the same customized order management, technical support, logistics, and special product grades that they offer to larger, more profitable customers. This often creates a situation where 70 to 80 percent of the customer base generates only 10 percent of the gross margin, while damaging return-on-sales performance by swallowing 30 to 40 percent of total sales, general, and administrative (SG&A) costs (Exhibit 1).

One way to fix this problem is to segment customers based on their profitability after accounting for cost to serve and then modify the service levels provided for each segment. The highest-value customers should be given a broad line-up of options for delivery flexibility and packaging, field technical service, laboratory support, customized grades, and field sales staff; low-value customers receive these service elements only if they pay separately for them. Often, this exercise leads to moving the lowest-value customers to

Exhibit 1

Having many small customers can create complexity and often dilutes profits.

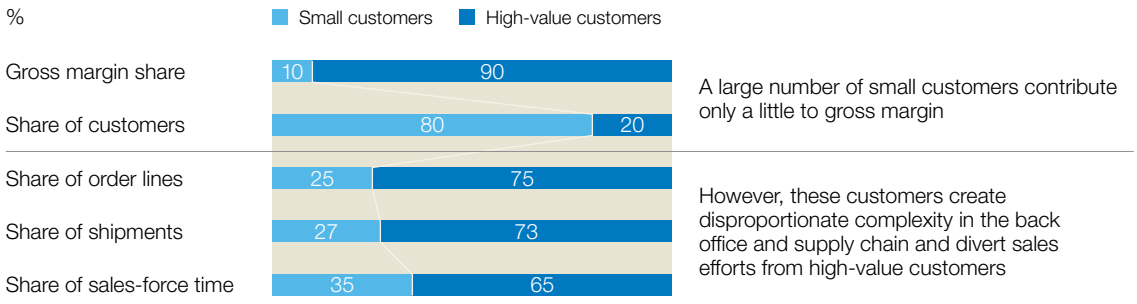

Exhibit 2

Differentiated service levels and a new approach to distributor management can raise profitability significantly.

Impact on return on sales, percentage points

Lever	Complexity-reduction model: Differentiate service levels for small accounts	Complexity-reduction model: Manage distributor as key account	Comments
Margin improvement	1.8	1.0	• Give lower discounts to distributors and impose higher prices in phone-sales channel
Sales (frontline and back-office)	0.5	0.2	• Reduce costs by scaling back frontline and back-office sales functions
Technical application	0.6	0.2	• Reduce technical services for lower-tier segments
Outbound freight	0	0.2	• Bundle shipments to distributors • Increase single-location and full-truckload deliveries
Warehousing	0	0.1	• Distributors cover most warehousing cost • Reduce order lines
Other	0	0.1	• Realize other benefits of distributor consolidation, eg, reduce payment terms
Total[1]	**2.8**	**1.7**	• Typical impact from complexity reduction

[1] Figures do not sum due to the effects of rounding.

distributors, which are better equipped to handle these customers' needs—providing smaller quantities, shorter lead times, and complementary products. One company that undertook a segmentation found that 45 percent of its customers—which contributed less than 10 percent of sales but nearly 20 percent of SG&A—would be better served by distributors.

While customer segmentation is conceptually easy, it sticks only with considerable effort. The new service levels and segmentation should be incorporated into contract terms, and sales bonuses should be tied to account profitability after all costs to serve have been covered, thus removing the temptation to give away additional services as in the past. Some companies have gone further, making organizational changes (for example, moving to inside phone sales instead of using travelling sales representatives) and hardwiring service-level rules into their ordering systems.

Segmentation can drive significant profitability improvements. One North American specialty-chemicals business that used this approach increased its total return on sales by 15 percent within 12 months. It did this by reclassifying

all but the most profitable accounts to the appropriate service tiers and imposing strict rules on service levels. Furthermore, by shifting to phone sales for small customers, margins for this segment grew by about 15 percent and volume rose by as much as 30 percent. Overall customer satisfaction also improved, as more frequent phone contact drove a better understanding of smaller customers' needs.

From stockist to key account:
Leveraging the full potential of distributors

Too many chemical companies still see distributors as inventory-stocking, margin-absorbing delivery services. However, the most successful go-to-market models recognize that distributors can act as service providers and an extended sales force—the two critical roles needed to serve small accounts.

Redefining the distributor relationship requires more than a simple mind-set shift; it requires better selection and management of distributors. Companies must approach the selection of distributors with the same rigor used in the selection of a top vendor, including proper requests for quotations, distributor selection days with one-on-one meetings, and detailed screening. The company's objectives should determine the kind of distributor that is selected. For growth and small-customer service, for example, midsize distributors may be the best match since they offer sufficient reach and are hungry to expand customer portfolios and regions.

Once relationships with the right distributors are established, they must be nourished. The central feature of the highest-performing relationships is that the chemical company treats the distributor as a key account with significant volume and growth potential. Hallmarks of best-practice approaches include designating a dedicated distributor manager in the commercial organization; relieving restrictions to allow distributors to attack a broader range of customers; installing a tiered pricing structure driven by growth and service performance, not just volume; and investing to develop the skills and product knowledge of the distribution sales forces.

Improved distributor management works (Exhibit 2). One European surfactants maker saw gross margins rise by six to nine percentage points within six months of reselecting and consolidating its distributor base. Many products became more profitable than they had been when they were sold directly to small customers. The company is currently on track to increase the profitability of its small-customer business by 15 to 20 percent over the next two years.

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